The Location of Alashiya: New Evidence from Petrographic Investigation of Alashiyan Tablets from El-Amarna and Ugarit
Author(s): Yuval Goren, Shlomo Bunimovitz, Israel Finkelstein, Nadav Na'Aman
Source: *American Journal of Archaeology*, Vol. 107, No. 2 (Apr., 2003), pp. 233-255
Published by: Archaeological Institute of America
Stable URL: http://www.jstor.org/stable/40026076
Accessed: 03/03/2009 04:36

Your use of the JSTOR archive indicates your acceptance of JSTOR's Terms and Conditions of Use, available at http://www.jstor.org/page/info/about/policies/terms.jsp. JSTOR's Terms and Conditions of Use provides, in part, that unless you have obtained prior permission, you may not download an entire issue of a journal or multiple copies of articles, and you may use content in the JSTOR archive only for your personal, non-commercial use.

Please contact the publisher regarding any further use of this work. Publisher contact information may be obtained at http://www.jstor.org/action/showPublisher?publisherCode=aia.

Each copy of any part of a JSTOR transmission must contain the same copyright notice that appears on the screen or printed page of such transmission.

JSTOR is a not-for-profit organization founded in 1995 to build trusted digital archives for scholarship. We work with the scholarly community to preserve their work and the materials they rely upon, and to build a common research platform that promotes the discovery and use of these resources. For more information about JSTOR, please contact support@jstor.org.

Archaeological Institute of America is collaborating with JSTOR to digitize, preserve and extend access to *American Journal of Archaeology.*

http://www.jstor.org

The Location of Alashiya: New Evidence from Petrographic Investigation of Alashiyan Tablets from El-Amarna and Ugarit

YUVAL GOREN, SHLOMO BUNIMOVITZ, ISRAEL FINKELSTEIN, AND NADAV NA'AMAN

Abstract

Ancient Near Eastern archives of cuneiform texts contain tablets whose origin is unknown. Letters often do not contain the name or address of the sender. Moreover, the locations of some ancient Near Eastern countries and cities have not yet been clearly established. Hence we perform a research program that intends to fill this gap through a systematic provenance study of the Amarna letters and other Near Eastern texts using petrographic and geochemical methods. So far, over 300 tablets have been analyzed. This paper presents the provenance of the Alashiya letters from Amarna and Ugarit as well as an assemblage of Cypro-Minoan texts from Cyprus. Petrographic and chemical examinations indicate that the Amarna letters from Alashiya originate from the area on the margin of the Troodos Mountains in Cyprus. Various lines of evidence make it clear that the raw material was collected by the scribes in their immediate vicinity and not transported over large distances. Within Cyprus, either Kalavasos-*Ayios Dhimitrios* or Alassa *Paliotaverna/Pano Manadilaris* are identified as the source of official Alashiyan letters. Since the geopolitical configuration of Late Bronze Age Alashiya is still unclear, the implications of our conclusions for this vexed issue are discussed.*

For more than a century researchers have debated the location of the Bronze Age kingdom of Alashiya, "that old conundrum" as Muhly so aptly dubbed it,[1] with diminishing returns.[2] The textual evidence, from both Amarna and Ugarit, indicates that during the 14th and 13th centuries B.C. Alashiya maintained economic and political contacts with Egypt and north Syria. The documents testify that it produced and exported large amounts of copper. They also indicate that it was an independent state, as its king was referred to as "brother" in his correspondence with the King of Egypt, a designation that was used between rulers of equal rank.

Most scholars associate the copper producing land of Alashiya with part or all of Cyprus (fig. 1). This conclusion is supported by an overall interpretation of the relevant documents within the historical, geopolitical, and archaeological background of the eastern Mediterranean in general and Cyprus in particular.[3] The place of origin of the Alashiya tablets was generally identified at Enkomi near the eastern coast of the island. A minority view considers the data circumstantial and inconclusive.[4] Scholars advocating the latter view tend to identify Alashiya in either part or all of Cilicia, or part of northwestern Syria.[5]

Previous provenance studies have attempted to resolve the question by establishing the origin of the Alashiya clay tablets found in Amarna and Ugarit. Eight tablets dispatched from Alashiya to the Egyptian court in the 14th century B.C. were discovered in Amarna (EA 33–40). An unnamed king of Alashiya sent seven of these letters (EA 33–39) to an unnamed Pharaoh, while the governor of Alashiya dispatched the eighth letter (EA 40) to his equal in the Egyptian court. A group of scholars from the Laurence Berkeley Laboratory subjected two of the tablets (EA 34 and EA 35, now in the British Museum) to neutron activation analysis (NAA) in order to determine their origin.[6] The results were compared with Late Bronze Age pot-

*We wish to thank B. Salje and J. Marzahn from the Vorderasiatisches Museum in Berlin, J. Curtis, S. Bowman, C. Walker and A. Middleton from the British Museum, P.R.S. Moorey from the Ashmolean Museum, S. Hadjisavvas and P. Florentzos from the Department of Antiquities, Cyprus, A. South from the Vasilikos Valley Project, Kalavasos, A. Caubet and B. André-Salvini from the Musée du Louvre for the permit to sample materials from their museums or excavations. The ICP analyses and the micropaleontological identifications were made by the Geological Survey of Israel. This study was supported by the Center for Collaboration between Natural Sciences and Archaeology of the Weizmann Institute of Science and the Fund for Internal Researches of the Tel-Aviv University. We thank G. Constantinou, I. Freestone, L. Grossowitz, S. Hadjisavvas, M. Huges, A. Middleton, N. Porat, I. Segal, A. Shimron, L. Smith, A. South, and S. Vaughan for their useful advice on specific topics discussed in this article.

[1] Muhly 1996, 49.

[2] For comprehensive and critical discussions of the data and previous literature, see Merrillees 1987; Knapp 1996a.

[3] See, e.g., Holmes 1971; Muhly 1972, 1989, 1996; Knapp 1985, 1996a.

[4] Hellbing 1979; Merrillees 1987.

[5] See Merrillees 1987 for a review of literature.

[6] Artzy et al. 1976.

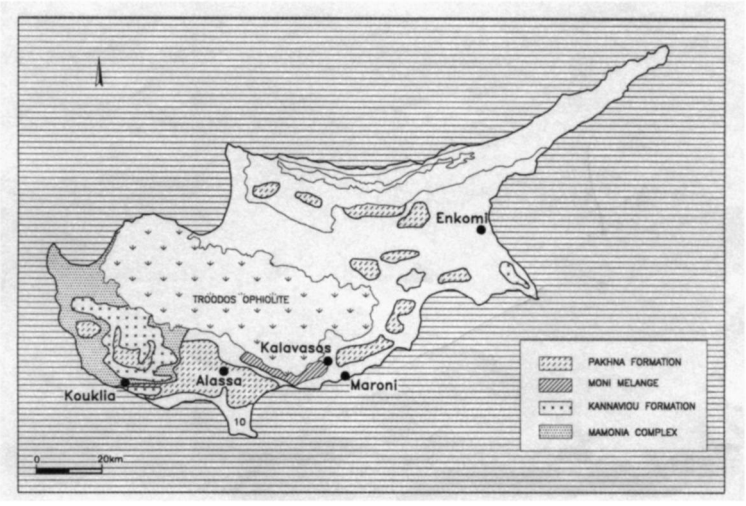

Fig. 1. General geological map of Cyprus showing the distribution of the formations and the location of the LBA sites mentioned in the text

tery from different sites in Cyprus and the Levant. The Berkeley team concluded that the two tablets, which have similar chemical composition patterns, were not made of eastern Cypriot clay and hence were not produced in the vicinity of Enkomi. Moreover, they are chemically different from the clays of Toumba tou Skourou near Morphou Bay, Lapithos and other places in the north of Cyprus, Nitovikla and other sites in the Karpas, and Kition, Hala Sultan Tekke, and Amathus on the Larnaca and Akrotiri bays in the south. Certain chemical similarities were found between the two tablets and Mycenaean IIIC1 sherds from Kouklia *Palaeopaphos*, although an unequivocal identity between the tablets and the Kouklia clay could not be proved. Artzy and her colleagues also concluded that the two tablets are not copies made in Egypt, since they differ from clays used for the production of New Kingdom pottery in Amarna and elsewhere in the Nile Valley. A later analysis of two additional Alashiya tablets (EA 33 and EA 38; now in the Vorderasiatisches Museum in Berlin) by the same team showed similar results.[7] To sum up, the NAA investigations fell short of determining the location of Alashiya.

The present authors attempted to broaden the analytical basis established by Artzy and her colleagues by examining four Alashiya letters found at Amarna (EA 33, 34, 37, and 38)[8] and one Alashiya letter from Ugarit (RS L.1) in the course of a wider project of petrographic investigation of the Amarna tablets. The following research strategies were used:

1. examination of tablets that were not included in the previous research, especially EA 37 that, as already noted by Knudtzon,[9] was different in its general fabric and inclusions;
2. examination of clay documents from Late Cypriot (LC) sites in Cyprus, especially Enkomi;
3. analysis of a 13th-century B.C. Alashiya letter from Ugarit;
4. examination of the previously analyzed tablets by other methods, namely petrography and inductively coupled plasma spectroscopy (ICP).

METHODS

Various physical and chemical techniques are employed for analyzing the composition of ceramic artifacts. The former identify the minerals in the clay and temper and define the fabric of the sherd or vessel. The latter use diverse analytical techniques to measure the concentrations of the elements in the clay. In analyzing pottery, petrography is the physical method of choice, whereas NAA is the most commonly used chemical method. Petrographic analysis is particularly effective for examining coarse, poorly fired ceramics, while NAA is generally considered to be more accurate for provenance determinations, being fully quantitative and thus more precise. Usually, petrography is applied to a large number of items, and the results are used to select samples for further chemical analysis.[10] When cuneiform tablets are analyzed, the sampling

[7] M. Artzy, pers. comm., see Hellbing 1979, 71, n. 103.

[8] Permission to examine the letters was granted by the British Museum, the Vorderasiatisches Museum in Berlin, and the Musée du Louvre. EA 35 (British Museum) was not available at the time of sampling.

[9] Knudtzon 1915, 1272, n. 2, 1275, n.1, 1276, n. 1, 1294, n. 2, 1298, n. 1.

[10] Schubert 1986.

must be nondestructive and only restricted analyses can be applied. Consequently, chemical methods often are more appropriate because of the smaller sample that they require.

Accurate interpretation of provenance data depends on the availability of comparative materials. Clay types used to produce tablets, however, are not necessarily the same as those from which vessels are manufactured. This may sometimes inhibit the use of routine chemical procedures in which a database containing the elemental composition of standard pottery from known sites is compared with the samples examined. Conversely, petrography has the advantage of being independent, since the results can be interpreted on the basis of detailed and usually available geological data. Therefore, petrography has been selected as a primary method for the present research and applied on over 300 tablets. Elemental analysis by inductively coupled plasma atomic emission spectroscopy and mass spectroscopy (ICP-AES/MS) was applied on 120 of these tablets in order to confirm the petrographic grouping by multivariate elemental plots of 27 major, minor, and trace elements.[11]

Two new techniques were developed in order to reduce the sample size. First, scattered petrographic analysis (SPA), a technique in which the clay and the temper are sampled separately, was applied on complete tablets. The tablet is first examined under a stereomicroscope to define its texture. A tiny flake of the matrix is chipped from a hidden surface using a scalpel, and a representative sample of the inclusions is removed as single grains. In the laboratory, each is impregnated with thin section epoxy resin in a vacuum within a plastic mold. Second, in the more common case of broken tablets, peeling was applied in order to obtain larger samples. In this analysis, a shallow lamina is peeled off the broken facet of the tablet with a scalpel and impregnated in a plastic mold to prevent desegregation. After curing, the pellets are used for the preparation of thin sections.

Micropaleontological study of the clay matrix was also deployed, using the *foraminifera* index in order to identify the age (hence the possible geological formation and origin) of the clay. *Foraminifera* are one of the main groups of the unicellular organisms *Protozoa.* Most live in marine environments, while some species live in inland and freshwater areas. Marine *foraminifera* are divided into two main groups: those living in the water mass (planctonic) and those living on the sea floor (bentonic). The identifications were made in the Geological Survey of Israel. In many cases they either confirmed the petrographic and chemical interpretations or narrowed the range of options.

We adopted the widely accepted identification of Alashiya in Cyprus as a working hypothesis but also examined other possibilities. We compared the mineralogical and chemical data from the tablets with the geology of Cyprus as well as Cilicia and northwest Syria.

RESULTS

The Alashiya Letters from Amarna

The results of the petrographic study of the tablets are summarized below according to an order of importance of the petrographic data and not the order of the EA (serial) numbers.

EA 37 is distinguished to the naked eye by its color and appearance from all other Alashiya tablets in the study (EA 33, EA 34, and EA 38; and the other Alashiya tables). The fabric is generally reddish-brown rather than cream whitish-gray. There are large inclusions (reaching 3 mm in size) that do not appear in other Alashiya tablets, and the texture is coarser than that of the other Alashiya letters from Amarna (figs. 2–3).

The petrographic properties of this tablet are entirely different from the other Alashiya tablets from Amarna examined here. It has a more clay-rich matrix with abundant inclusions of weathered spilitic basalt, limestone, low-grade metamorphic greywacke, quartz, and flint.[12] The other Amarna

[11] ICP-AES was performed using a Jobine Yvon JY-48 polychromator. This method was used to analyze most of the major and minor elements (Mg, Al, Si, Ca, Ti, Mn, Fe, P, S) as well as some trace elements (V, Cr, Co, Ni, Cu, Zn, Sr, Y, Ba, Be, La). ICP-MS was used to determine all rare earth elements (Ce, Pr, Nd, Sm, Eu, Tb, Dy, Ho, Tm, Yb, Lu).

[12] The matrix of EA 37 is carbonatic, slightly silty, yellowish-tan in plain polarized light (PPL) and contains abundant reddish spherical bodies that sometimes preserve skeletal structures of columnar plagioclase. These may accord with the ferric illite described by Vaughan (1989). These vary in size from about 50μm up to 500μm. The origin of these bodies is made clear by the examination of the inclusions, in which weathered spilitic basalt is apparent. These weathered rocks were probably the origin for their residues in the matrix, in which remnants of skeletal feldspar crystals can still be seen. Therefore, the matrix of this tablet may be defined as clay containing highly weathered basaltic clasts. The inclusions contain rounded fragments of highly weathered spilitic basalt fragments including skeletal plagioclase laths (sometimes branching) ophitically enclosed by melanocrats that partly or completely altered into red clay (fig. 2). These inclusions, exceeding 3 mm in size, also include some clasts of better preserved spilite. Additional inclusion types are limestone fragments, rounded, spherical fragment of quartzitic microgranular greywacke (fig. 3), tan mudstone with *radiolaria* microfossils, clinopyroxene, epidote, quartz, and chert. The matrix contains small planctonic foraminifers: *Hedbergella* and *Heterohelix*, all of Senonian age.

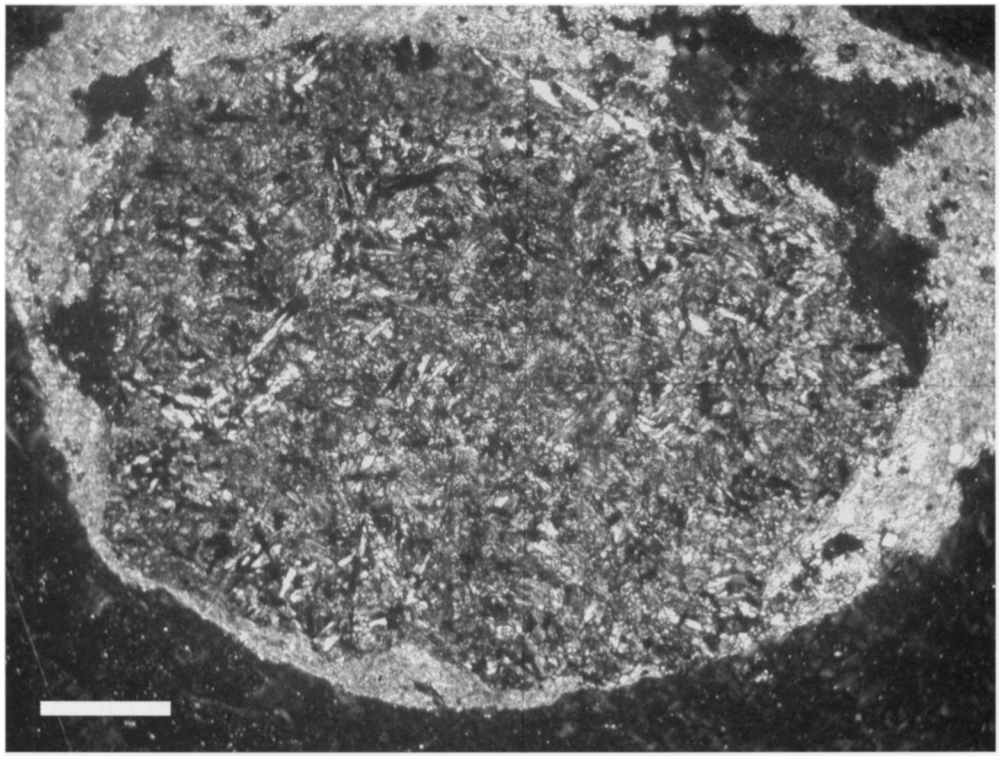

Fig. 2. Thin-section of EA 37, showing highly weathered spilite inclusion. Crossed polarizers, bar size: 0.2 mm.

letters (EA 33, 34, and 38) are characterized by marl with a few calcareous and volcanic rock fragments (fig. 4).[13]

Comparative Study of Cypro-Minoan Texts from Enkomi and Kalavasos Ayios Dhimitrios

Two sets of Cypro-Minoan texts on clay from Cyprus were examined: an assemblage of documents from Enkomi and inscribed clay cylinders from Kalavasos *Ayios Dhimitrios.*

The Enkomi samples were taken from the following items (all but the last in the Cyprus Museum in Nicosia): E-1687, a Cypro-Minoan inscribed clay tablet found in Level III A (late 13th–early 12th century B.C.);[14] H-1885, a Cypro-Minoan inscribed clay tablet found in Level I B (mid late 15th century B.C.);[15] E-1610, a Cypro-Minoan inscribed clay cylinder;[16] E-1193+Enk. F.E 20.01, two joined fragments of a Cypro-Minoan inscribed clay tablet, one (E-1193) found in Level IIIB (12th century B.C.) and published by Dikaios,[17] the other (Enk. F.E. 20.01) was found by Schaeffer;[18] AM 2336, a Cypro-Minoan inscribed clay tablet (now at the Musée du Louvre).

In terms of petrography, the Enkomi documents are extremely homogeneous.[19] The unimodal nature of the inclusions, in terms of shape and sorting, may be considered to represent alluviated detrital sediments. These include volcanic and sedimentary rocks of varying types. The matrix can be generally defined as marl. The inclusion deposits may have been derived from an area containing

[13] The matrix of EA 34 is calcareous, pale yellow in PPL, optically active speckled b-fabric, with abundant mica flakes (both muscovite and biotite) as well as fine silt of calcite, quartz, and feldspars (fig. 4). The foraminifers include *Globigerina* and *Globorotalia* of Neogene age. The tablets are almost devoid of inclusions. Few angular grains of dolerite, micritic limestone, quartz, foraminiferous chalk, and occasionally hair appear.

[14] Dikaios 1971, 881–91, pl. 317–8.

[15] Dikaios 1971, 881–91, pl. 314.

[16] Masson 1971.

[17] Dikaios 1971, 881–91, pl. 319–20.

[18] Karagorghis 1970, 249, fig. 99. For the join, see Michaelidou-Nicolaou 1980.

[19] They are represented by clay that is light yellowish-tan in PPL, carbonatic and lightly optically oriented in thin section, slightly silty and stained by orange-brown clay concentrations and iron-rich (limonitic) bodies. Foraminifers are extremely rare. The inclusion suit is made of a well-sorted population of various minerals and rock fragments, all spherical to subangular and usually rounded grains, including quartz, limestone, spilitic basalt, chert, feldspars, serpentine, pyroxene, and epidote.

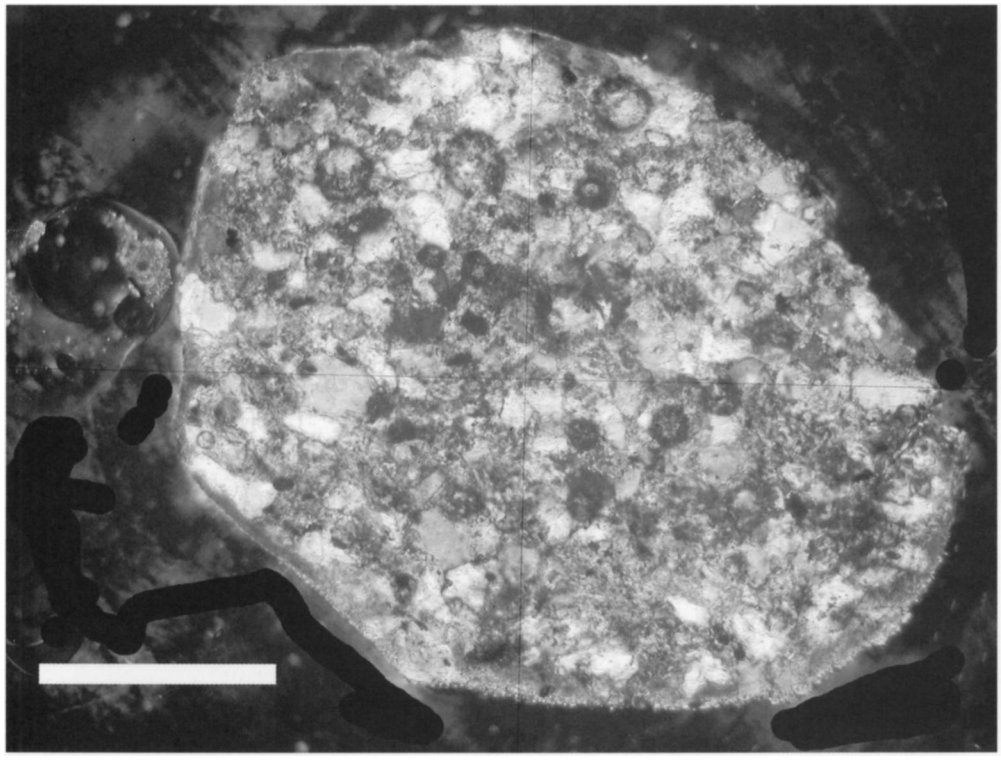

Fig. 3. Thin-section of EA 37, showing low-grade metamorphic greywacke inclusion. Crossed polarizers, bar size: 0.2 mm.

several lithological environments, including igneous and marine sedimentary rocks.

The effect of stream transportation may sort material by mineralogy (specific gravity), resistance to mechanical and chemical weathering, abundance along the drainage basin, and the flow regime of the conduit. The general sphericity of all the inclusion components, especially the resistant chert and quartz, may indicate a far distance between the bedrock and the depositional area where the inclusions were collected.

Enkomi is situated in eastern Cyprus, 7 km north of Famagusta. It is located in an area of Quaternary deposits containing gravel, sand, silt, and clay. Sediments now obstruct the nearby stream of the Pedhieos River, going by the southern edge of the site. During the Late Cypriot period, however, it was most likely still active, functioning as a sailing channel for boats between the coast and Enkomi, and perhaps even more inland.[20] The Pedhieos river drainage system included the Mesaoria plain, the southeastern part of the Kyrenia terrain, and the northeastern slope of the Troodos massif. Because sedimentary rocks cover all the Mesaoria terrain, the Pedhieos River is the only possible supplier of volcanic rocks and their derived minerals to the Enkomi area. In conclusion, the composition of the Enkomi documents indicates a mixture of marl with well-sorted sand from the nearby channel of the Pedhieos River.

The samples from Kalavasos *Ayios Dhimitrios* included the following Cypro-Minoan inscribed cylinders: K-AD 82.389, K-AD 82.405, K-AD 82.404,[21] and K-AD 83.545.[22]

Petrographically, the cylinders form two groups. The first is identified as originating in the autochthonous Troodos clays of the Kannaviou formation, a main fabric of the local Base Ring Ware at Kalavassos *Ayios Dhimitrios*.[23] Members of this group are K-AD 82.389 and K-AD 82.404.

The second group is petrographically similar to EA 37 (above). It includes K-AD 82.405 and K-AD

[20] Catling 1964, 17; Dikaios 1969, 10.

[21] Masson 1983, 131–2.

[22] Masson 1989, 38–9.

[23] This group has clayey matrix, reddish-tan in PPL, sparkled birefringent and optically oriented with silty quartz accompanied by very abundant mica laths, epidote, and plagioclase. The inclusions contain quartz, plagiogranite, phyllite, epidote, chert, mica, apatite, and opaque minerals. The firing temperature is usually around 700°C. See Vaughan 1989 for comparable material from Kalavassos *Ayios Dhimitrios*.

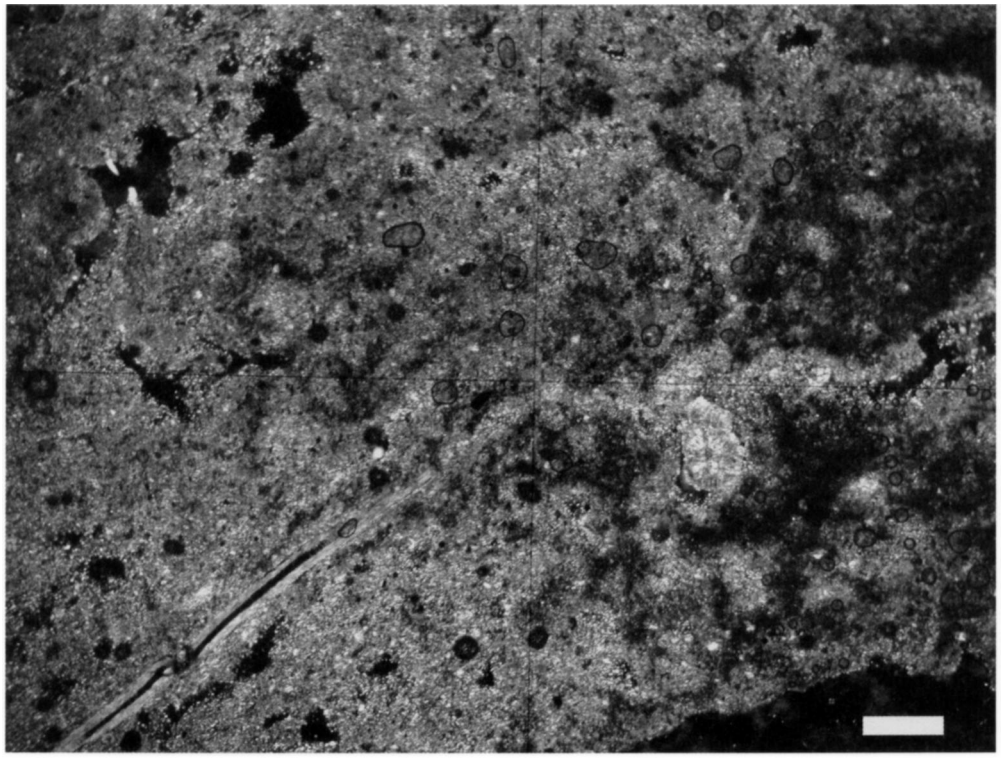

Fig. 4. Thin-section of EA 34, showing marl with limestone inclusion (bottom, center) and a goat hair (bottom, left). Crossed polarizers, bar size: 0.2 mm.

83.545. This petrofabric is also known from the Base Ring Ware of Kalavasos *Ayios Dhimitrios*.[24]

An Alashiya Letter from Ugarit (RS L.1; AO 21087)

Most scholars agree with the hypothesis put forth by Nougayrol and others that RS L.1 was sent from Alashiya and that letter 20.238 from Ammurapi King of Ugarit responded to it.[25] Yet, a minority view opposes this explanation. Because the letter lacks any toponym of the sender, Singer[26] and Yamada[27] suggest that RS L.1 must have been a letter from the King of Carchemish, the overlord of Ugarit at the time of Ammurapi. Malbran-Labat[28] and Yon[29] recently have accepted this theory.

The clay of the tablet is light reddish in color with badly sorted dense inclusions, up to 1 mm in size. The great majority of the inclusions are dolerite fragments and their derived minerals, perhaps with some additional gabbroic inclusions (fig. 5). Serpentine is common in lesser grain sizes. Limestone and chert form a minority of the inclusions.[30] These characteristics accord well with the dolerite-derived reworked clay from the Troodos contact zone between the volcanic series and the sedimentary formations (below).

Before using the petrography of RS L.1 as evidence for the location of Alashiya, it is mandatory to examine the possibility of an origin in Carchemish. The geological mappings of the area between Gaziantep and Carchemish indicate that the sediments around the site and upstream the Euphrates are very homogeneous.[31] Carchemish is located on

[24] This group is characterized by carbonatic matrix, tan in PPL with silty quartz accompanied by mica laths, pyroxenes, and calcite. The inclusions are made of spilitic basalt and disintegrated minerals derived from these rocks (clinopyroxenes, amphiboles, and feldspars), foraminiferous chalk fragments, quartzitic microgranular sandstone, and replacement chert. See Vaughan 1989 for comparable material from Kalavassos *Ayios Dhimitrios*.

[25] Nougayrol et al. 1968, 86, n. 1, 695–7.

[26] Singer 1983, 217; 1999, 720, n. 394.

[27] Yamada 1992, 438–50.

[28] Malbran-Labat 1999, 122.

[29] Yon 1999, 118.

[30] The matrix is dense, tan in PPL and containing opaque minerals and silty quartz, twinned plagioclase, biotite, epidote, calcite, and serpentine. The inclusions are badly sorted, including an assemblage of angular igneous and sedimentary rock fragments and their derived minerals including dolerite to microgabbro and their derived minerals, fossiliferous limestone, serpentine, replacement chert with iron mineral stains, and quartz.

[31] Tolun and Pamir 1975; Ulu 1996a, 1996b.

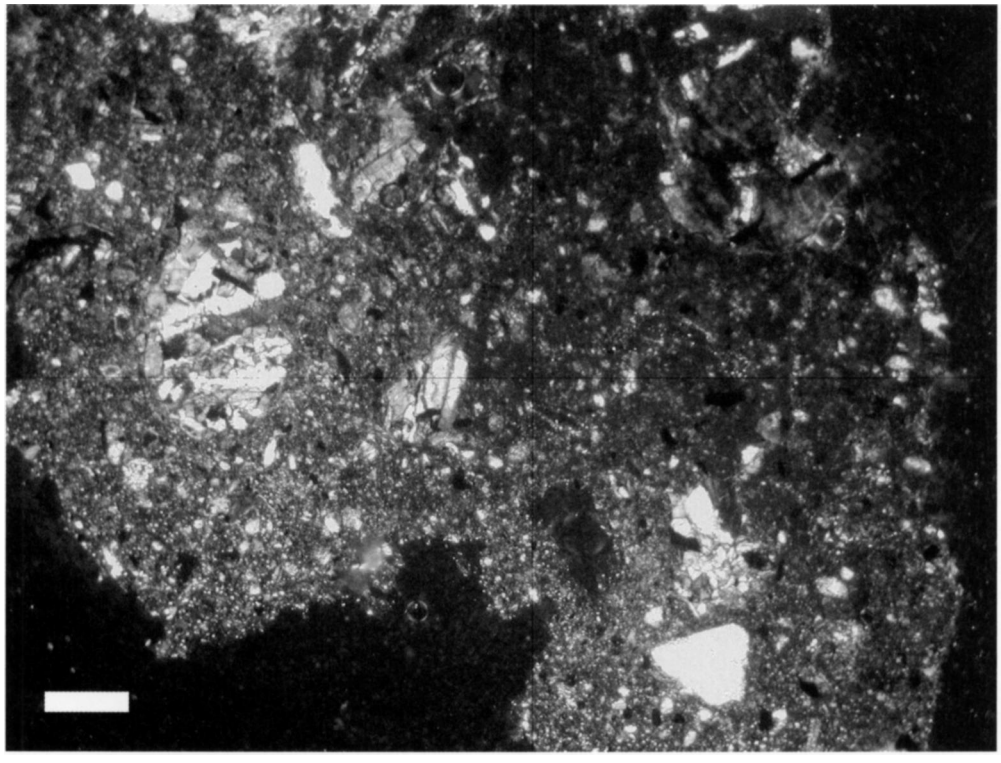

Fig. 5. Thin-section of RS L.1 showing two dolerite inclusions. Crossed polarizers, bar size: 0.2 mm.

recent Euphrates fluvial sediments; immediately next to it lies the Gaziantep Formation of the Upper Eocene, composed of silty, clayey, or chert-including limestone or chalk with glauconite concentrations. North of the site, Quaternary "Old alluvium" with partly consolidated clay, sand, and gravel can be found. Igneous rocks are exposed only 45 km to the north as the crow flies, near Hamut Dağı. They include tholeiitic and alkali olivine basalts but neither dolerite nor gabbro. Ophiolitic exposures of the Koçali complex appear only some 34 km further north, near Yaylaek, but like the Tauric ophiolites they contain only serpentinized ultrabasics, silicified shale, radiolarites, and very limited pillow lavas. Therefore, the lithology indicated by RS L.1 is nonexistent around Carchemish.

Fabrics of ceramics that are made of Upper Euphrates sediments are expected to reflect some of the above-mentioned components. Although no petrographic reference to the Carchemish ceramics has been recorded so far, relevant data are supplied by the Bronze Age pottery from Tell Hadidi, located somewhat south of Carchemish but still within the same geological environment.[32] There is no reference to any fabric resembling RS L.1 in these data.

The final and decisive blow to the Carchemish alternative for the origin of RS L.1 is given by a contemporary letter—RS 8.333 (AO 19.955, PRU III, 7–8), which was written by the King of Carchemish. The petrographic traits of RS 8.333 resemble those of the Mesopotamian (Babylonian and Mitannian) tablets from the Amarna archive.[33] They indicate that the Euphrates clay-silt was used without any intentional addition of sand inclusions, as a result of the silty nature of these sediments. Similar characteristics are known from the pottery that was produced in this general region.[34] This, again, stands in contrast to the characteristics of RS L.1.

In conclusion, the theory connecting RS L.1 to Carchemish should be readily dismissed. Since no other interpretation has ever been suggested for the origin of this letter, and taking into consideration the textual evidence in it, we take it for grant-

[32] Mason and Cooper 1999.

[33] See Goren et al. (forthcoming). Under the petrographic microscope the matrix of this tablet is ocher to orange-tan in PPL, birefringent with speckled b-fabric, and very strong striated optical orientation. The silt is rich in mineral types including muscovite, quartz, calcite, serpentine, hornblende, opaques, rutile, zircon, and feldspar. However, very few accidental grains of micritic limestone appear as inclusions.

[34] Franken and Van As 1994.

ed that this is a letter from Alashiya that can and should be used in the search for the political center of Alashiya in the Late Bronze Age.

THE ORIGIN OF THE ALASHIYA LETTERS

Petrography and the Cilician and North Syrian Theories for the Location of Alashiya

A macroscopic comparison of the fabric of the eight Amarna tablets from Alashiya indicates that all except one (EA 37) are homogeneous in terms of color of clay, quality, type of inclusions, polish, and texture. EA 37 differs in its fabric, grits, and general texture.[35]

A preliminary petrographic observation of EA 33, 34, and 38 supplies inconclusive evidence for the nature of the geological environment from which their clay was derived. Neogene marl and limestone (the latter seen in EA 34) are too widely distributed to pinpoint a specific geographical location within the Near East. Even if we exclude the Enkomi area on the basis of the NAA results,[36] the petrographic data still leaves open many other possibilities within the various regions that were suggested in the literature for the location of Alashiya.

The two remaining tablets—EA 37 and RS L.1—are coarser and gritty and therefore enable better petrographic determination. Both tablets share the same affinity: the main inclusion constituents were derived from an area consisting of basic igneous rocks (dolerite, gabbro, spilitic basalt, and volcanic glass), with a set of sedimentary rocks (limestone, chalk, sandstone, mudstone, and chert) accompanying the igneous assemblage. These compositional, textural, and mineralogical characteristics suggest that the source area includes the margin of an ophiolite complex[37] where pillow lavas and dolerite are exposed. Therefore, the lithology reflected by the raw materials of these two tablets points to a contact zone between an ophiolitic complex and a sedimentary area containing carbonatic, argillaceous, and siliceous sedimentary rocks.

Of all the typical components of the ophiolitic succession, a very limited range of rock types is represented in EA 37. The magmatic constituent includes only spilites, or rather their weathering products (with the minute addition of some other mafic minerals), with the addition of a set of sedimentary rocks. This hints at a clay type that is directly derived from the weathering of pillow lavas, in a zone that is proximate to exposures of marine sedimentary rocks, which include limestone and replacement chert. The very limited distribution of the clay and the selection of the inclusions indicate that the area from which they were derived was bounded within the margin of the ophiolite complex. The data supplied by RS L.1 supplements this picture. The homogeneous assembly of inclusions, dominated by basic volcanic/intrusive rocks (dolerite-microgabbro), indicates an area where these rocks form the dominant constituent of the local lithology. Apart from their degree of weathering and the relative proportions of the accompanying sedimentary rocks, the two tablets seem to have been derived principally from closely related geological environments.

In the eastern Mediterranean region, ophiolite complexes are found in Cilicia, northwest Syria, and Cyprus. Ophiolites form the Troodos massif in southwestern Cyprus, the Mersin and Pozanti-Karsanti massifs in Cilicia, the Kizildağ massif in Hatay Province, Turkey, and the Baër-Bassit massif of northwest Syria.[38] Thus, it is an amusing coincidence that ophiolitic occurrences can be found in each and every area suggested for the location of Alashiya. Nevertheless, a closer examination of the geological data enables the elimination of most of these locations and a rather explicit identification of the source area of EA 37 and RS L.1.

Hall first raised the hypothesis that Alashiya was located in Cilicia,[39] and Merrillees later advocated it.[40] Merrillees suggested identifying it with the Gulf of Iskenderun, possibly with a site such as Kinet Höyük, but admitted that this proposal must await further archaeological inquiry.[41] To test this hypothesis, the geology of the area that extends between Mersin on the western Cilician coast and the Gulf of Iskenderun must be examined.

---

[35] Hellbing 1979, 71–2.

[36] Artzy et al. 1976.

[37] Ophiolite complexes are presumed to represent oceanic crust, which was thrust onto continental crust. When complete, an ophiolite consists of a thin uppermost veneer of oceanic sediment (which may include oceanic clay and radiolarian cherts) overlying quenched pillowed basalts and more mature lavas, which in turn overlie a sheeted dolerite complex. Beneath the dolerites are texturally isotropic gabbros, which overlie layered gabbros, peridotites, and pyroxenites. These largely basic and ultrabasic components are cut by late-stage intrusions of coeval plagiogranite and overlay older oceanic sediments including radiolarites and limestone. As a consequence of its formation at spreading ridges, oceanic crust—and therefore ophiolites—experience ocean-floor metamorphism, which characteristically produces assemblages of greenschist and amphibolite facies. These metamorphites are often undeformed.

[38] Whitechurch et al. 1984.

[39] Hall 1913.

[40] Merrillees 1972, 1987.

[41] Merrillees 1972, 118.

The Mersin and Pozanti-Karsanti massifs are part of the "median" or Tauric ophiolitic belt of Turkey.[42] They form the most southeastern front of the Taurus ridge, between Faraşa and the plain north of Silifke.[43] The two ophiolites are in structural continuity with each other but are separated by the strike-slip fault of Ecemiş. The Mersin ophiolite exposes northwest of the city of Mersin, under the Miocene and Oligocene conglomerate reworking of the ophiolite. To the north, it lies on the Tauric limestone series. The Mersin massif continues the corresponding lithology of the Pozanti-Karsanti ophiolite north of it. It is made of a pile of tectonic slices, mostly of serpentinized harzburgite intercrested by isolated tholeiitic dolerite dikes. In the western part gabbroic and pyroxenic cumulates appear, interbedded with pillow lavas and radiolarites. In this complex the basaltic component is therefore minor and interlayered with the far more dominant peridotitic constituent.[44] Consequently, it is very unlikely that this assembly would supply a sediment in which basalt clasts would be dominant. This is especially true for the post-tectonic Miocenic sedimentary plain of the Cilician coast.

The same applies to the more northeastern area of Pozanti-Karsanti. This ophiolite outcrops over more than 100 km in length, covering more than 1500 km^2. Tectonically it lies over a series of limestones and radiolarites. Here too, thick outcrops of harzburgite form the main lithology, overlaying a crushed series of tectonic slices made of pillow lavas, radiolarites, pelagic limestones, and metamorphic rocks. Apart from these infra-peridotitic slices, the rest of the massif is formed entirely of coarse-grained ultramafic rocks.[45] Therefore, the same arguments raised against the Mersin ophiolite—namely, that the basalt clasts present in the tablets are devoid of the local geology—are equally true for this region.

In sum, the petrography of EA 37 and RS L.1 does not match the Cilician ophiolitic complex. Therefore, a coastal site in the Mersin Gulf of Iskenderun is unlikely to be the source for these tablets, especially in the case of RS L.1, which portrays a localized assembly of materials adjacent to the massif rather than materials that were washed off it into a sedimentary plain.

According to a second theory, first raised by Wainwright[46] and later supported by Merrillees,[47] Alashiya was located in northwest Syria or the Hatay. Two ophiolitic complexes expose in this area: the Kizildağ massif in the southwestern part of the Amanos range in the Hatay, and the Baër-Bassit massif west and south of the lower Orontes plain.

The Kizildağ massif forms the westernmost extension of the Amanos range and stretches onto the gulf of Iskenderun. A rich body of geological data enables a detailed investigation of this area.[48] The constituent rock types of the ophiolite complex crop out over an area of approximately 1,100 km^2 and although they resemble those of the Troodos massif in Cyprus (below), the effects of ocean-floor metamorphism is significantly more developed. It is unlikely that the source of the Alashiya tablets was in the plains around, or in the Kizildağ massif itself, because the pillowed basalts crop out over a very limited area on the mountaintop, which makes up under 0.5% of the region.[49] In other words, it is difficult to see how an alluvial clay could be formed that would contain the required percentage of pillow lava clasts. Moreover, the same arguments that were raised against the Cilician coastal sites—namely, that the basalt clasts are not dominant enough compared to what we see in the tablets—can be applied against northwestern Syrian coastal sites as well.

The Baër-Bassit massif of northwest Syria lies south of the Kizildağ massif, with the lower valley of the Orontes river and the plain of Antioch separating the two. Chenevoy,[50] Parrot,[51] and Whitechurch and Parrot[52] have described the geology of this massif, which covers an area of about 112 km^2. It differs from both the Troodos (below) and the Kizildağ massifs. Firstly, the constituent rock types are more strongly deformed. Secondly, they are more varied in composition because the ophiolite was tectonically interleaved with a variety of older sedimentary, igneous, and medium to high-grade metamorphic rocks. None of these rock types have been detected in the paste of the two Alashiya tablets under review.

Matson presented detailed petrographic data on the pottery assemblages of all stages at the Amuq Valley.[53] Additional information was retrieved from our thin-section collection of about 100 represen-

[42] Thierry 1980, 205.
[43] Thierry 1980, 215–20.
[44] Thierry 1980, 216.
[45] Bingöl 1978; Thierry 1980.
[46] Wainwright 1914–1915.
[47] Merrillees 1987.
[48] Dubertret 1955; Erendil 1984; Robertson 1986; Tekeli and Erendil 1986.
[49] Erendil 1984.
[50] Chenevoy 1959.
[51] Parrot 1974.
[52] Whitechurch and Parrot 1974.
[53] In Braidwood and Braidwood 1960.

tative Amuq ware fabrics (made from a systematic study collection prepared in the 1960s for the Israel Department of Antiquities). Both sources of information militate against the possibility that EA 37 and RS L.1 originated in this region. The ceramics of the Amuq sites are characterized by an entirely different clay and different temper types, in which serpentine predominates in the inclusions. A wide range of metamorphic facies is also represented in the inclusion assemblage. These components are not represented in the paste of EA 37 and RS L.1. Conversely, basalt and dolerite clasts, when appearing in the inclusions in the Amuq ceramics, are marginal. Additionally, in the Amuq pottery the chert fragments are always of the radiolarian class, an occurrence that stands in line with the radiolarian oceanic chert formations that are preserved near the Baër-Bassit and Kizildağ ophiolites.[54]

In conclusion, the areas of the plain of Antioch and the Hatay are not likely to be the source of EA 37 and RS L.1, despite the nearby ophiolitic complexes. Hence the only option left for the provenance of EA 37 and RS L.1, and consequently all the Alashiya tablets, is the island of Cyprus.

THE ORIGIN OF THE ALASHIYA LETTERS WITHIN CYPRUS

The geology of Cyprus indicates that the ophiolitic complex of the Troodos massif occurs in the central-western part of the island.[55] The massif forms much of the Troodos Mountains, the outcrop covering an area of 3,000 km^2. Two small outliers occur in the Akamas peninsula and at Troulli. Erosion has exposed all the constituent rock types of the ophiolite complex, which is exceptional for its little deformed state.

The concentric arrangement of the members of the ophiolite succession in the Troodos massif provides the most refined control on the mineralogical content of the alluvial deposits that develop both within and on the periphery of the mountains. The pillow lava series form the outer, incomplete ring that completes the structural units of the massif.[56]

A significant feature of the pillow lava outcrops of the Troodos range is that the rocks alter to form fine plastic clays, some of which have been used for pottery, tile, and brick production.[57] One of the most important clay deposits is near Kornos, where alluvial clays and silts from the river valley support one of the best known pottery and brick production centers in Cyprus.[58] Among other uses, these clays were known to serve until the 1960s for the production of pithoi (locally termed *pitharia*) in large quantities. The main production centers functioned in Kornos, Phini, and *Ayios Dhimitrios* in the Troodos area.[59]

For the sake of our discussion we have adopted the results of the comprehensive research made by Vaughan, primarily on Cypriot Base Ring Ware.[60] We have also used our own reference collection of clays from the relevant formations. The petrographic data concerning pottery production around the Troodos in all periods clearly indicate similar clays and clastic assemblies to the ones observed in EA 37 and RS L.1. The inclusion composition of both tablets suggests a contact area between the volcanic and marine sedimentary terrains. In the case of EA 37, another significant trait is the presence of the low-grade metamorphic greywacke. Contact regions between marine sedimentary and volcanic lithologies appear around the Troodos Mountains. The combined lithology of EA 37 and RS L.1 indicates that their origins should be looked for inland, not on the coast. The immediate contact zone between the dolerite and the basalt outcrops on the one hand, and the limestone exposures on the other, can be found in the northern, southern, and eastern edges of the Troodos area.

Tablets EA 37 and RS L.1 represent two related, but still different, fabrics indicating different origins. The fresh detrital igneous inclusions that

---

[54] Dubertret 1955, 91–4; Parrot 1977. This is contrary to the situation in the Troodos area of Cyprus, where these sediments are removed, and most of the chert found is a much younger Eocene replacement chert (of the Middle Lefkara formation). Indeed, the Mamonia complex in Cyprus and the mélange that is formed by the ophiolite reworking at the southeastern slopes of the Troodos contain radiolarian cherts to some extent, but these are accompanied by entirely different rock types.

[55] Geological map of Cyprus 1:250,000, 1995 ed.; see also fig. 2.

[56] Two units have been recognized: in the oldest series, designated the Lower Pillow Lava (LPL), the main rock types include andesitic-basalt, quartz-andesitic-basalt, quartz-microdolerite, and quartz-microgabbro. Of these the most common are the andesitic basalts. These lower division rocks are silica-rich and contrast with the younger Upper Pillow Lava (UPL) series, which are basic in composition, with olivine as one of the most common constituent minerals. The rock suit includes olivine-basalts and mugearites. An inner ring of the Troodos succession is formed mainly of sheeted dolerite dykes. See Gass 1980 for further details.

[57] Gass et al. 1994.

[58] Bagnall 1960, 103; Ionas 1998, 23, 109–10.

[59] Hampe and Winter 1962; London 1986, 1989; Keswani 1989, 17; Ionas 1998, 125–31.

[60] Vaughan 1987, 1989, 1991.

characterize RS L.1 indicate localized colluvial clay, which overlies the dolerite series of the Troodos. The presence of carbonates and chert, however, is incompatible with the use of locally available dolerite-derived clays that have been utilized in the Troodos area for pottery production.[61] Therefore, the origin of this tablet should be looked for in an area where the dolerite-derived clays are reworked and mixed with components of the supra-ophiolitic sediments that surround the Troodos complex. This area should contain limestone, reefal limestone, and chert. These requirements suit the region of the southern Cypriot coast from Petra tou Romiou to the Tremithes River, following through the eastern Troodos foothills to Petrofani in the north. In this region, the Lefkara and Pakhna formations contain a set of limestone, biogenic and coralline limestone, chert, and marls that may contribute these components.[62] The dominance and fresh state of the dolerite clasts suggests an area in the immediate contact zone between the igneous and sedimentary outcrops. This area should be looked for inland, where the Lefkara and Pakhna formations overlay the dolerite series.

The petrography of EA 37 indicates an assemblage of volcanoclastic, calcareous, siliceous, and argillaceous rock fragments. These include weathered basalt clasts, radiolarian mudstone, chert, limestone, fine-grained low-grade metamorphosed sandstones, and detrital minerals. This set corresponds with the data supplied by Vaughan for the typical clays of the Moni Mélange in the southeastern flanks of the Troodos massif.[63] An additional example of this set includes one of the inscribed cylinders from Kalavasos *Ayios Dhimitrios* (K-AD 82, 405, see above), which contains exactly the same inclusion suit as EA 37. This unique combination, all of which is represented in EA 37, is directly linked with the Moni formation.[64]

The Moni formation is exposed over restricted areas along the southern and southeastern foothills of the Troodos (fig. 2).[65] Although the nomenclature and subdivision of this formation is somewhat complex,[66] it is obvious that the sediments reworked by the mélange form the origin for the petrofabric of EA 37. Exactly the same petrofabric was found to characterize the Late Cypriot IIC vessels at Kalavasos *Ayios Dhimitrios*; a natural exposure is found just southwest of the site.[67] On a broader scale, the distribution of pottery that is made of the Kannaviou clays of the Moni Mélange is characteristic of the south coast area,[68] but the outcrops of the formation are restricted to the Troodos foothills between Yerasa and Pentacorno.

With the likely origin of EA 37 and RS L.1 found in the southeastern slopes of the Troodos, we started our search there for the source material of the Amarna letters from Alashiya that were made of pure marl (EA 33, 34, and 38). When the NAA study of the Amarna tablets was carried out, no major site in this area had been excavated; hence ceramic material from the region could not be compared with the clay of the tablets. Still, the correlation between the Alashiya letters and some of the pottery from Kouklia *Paleopaphos* hinted that the clay type that was used for some of the vessels at that site should be associated with that used for the tablets. The petrographic examination of EA 33, 34, and 38 indicates a type of cream-colored marl with occasional volcanic clasts. The paleontological data from EA 33 (the only case where the foraminifers were in an identifiable state of preservation) indicates Neogene marl. In the general area of the southern Troodos foothills, there is only one possible location for such a clay source: the marl member of the Pakhna formation (fig. 1), dating to the Lower Miocene.[69] This formation is distributed both in Kouklia and below the Troodos slopes, but it does not extend to Enkomi or other sites that were surveyed in the NAA analysis. The apparent but vague relation between the Alashiya tablets and the Kouklia pottery suggests that they were both made of marl of the same formation, but of different exposures or localities.

---

[61] Vaughan 1991, 353.

[62] Gass et al. 1994, 115–23, with the relevant references.

[63] Vaughan 1989, 80; 1991, 358–9.

[64] The Moni Mélange formation contains detrital igneous rock fragments and minerals that are frequently interbedded with silty lenses, mudstones, and umberiferous or radiolarian shales. Olistoliths that are made of lithologies that typify the Mamonia complex (considered to be part of an Upper Triassic to mid-Cretaceous continental margin) are embedded in the bentonic clay matrix, especially along the northern margin of the mélange. They include quartztose sandstone, clay-rich siltstone with other minerals that suggest a metamorphic or granitic provenance. The allochthonous materials are overlain in places by the Lefkara chalks of the Eocene age, which are rich in replacement chert, and by the Pakhna chalks (Miocene), which contain arenite lenses. As a result of weathering processes, the upper layers of the clays often contain random particles of the overlaying carbonatic rocks. See Gass et al. 1994, 111–4.

[65] Pantazis 1967, 38–46; Gass et al. 1994, 111–5.

[66] See Gass et al. 1994, 111 for details.

[67] Vaughan 1989, 79–80.

[68] Vaughan 1991.

[69] Gass et al. 1994, 123.

Marl deposits form part of the lowest chalk-marl member of the Pakhna formation.[70] The marl is remarkable by its cream to buff color, by its plasticity and, similarly to the tablets, by the relatively hard fabric that it forms after hardening.[71] The plasticity of the Pakhna marls is one of their most prized features, containing as they do significant percentages of the Troodos-derived montmorillonite. The shrinkage of this mineral seems to be naturally tempered by its mixture with illitic components from the carbonate sediments, making it an ideal potting material.[72]

Based on the above conclusions, we compared clays from the Pakhna and Moni formations as well as the lava-derived clays from Kornos and Phini. Samples of the Pakhna marl were taken from selected locations between Kouklia and Larnaca, especially near relevant Late Cypriot sites (table 1). The Moni formation was sampled in several locations around Moni and Pentacomo. The samples were soaked in water, formed into small briquettes, and fired at 600°C. The fired clays were thin-sectioned and examined petrographically. The study confirmed that RS L.1 is similar to the clay from the ceramic workshop at Kornos (sample CY-24 in table 1), although the latter lacked the sedimentary rock fragments. EA 37 is similar to a sample of reworked exposure of the Moni Mélange that was partly covered by the Lefkara formation chalks (sample CY-23). Tablets EA 33, 34, and 38 are petrographically similar to many of the samples taken from various sections of the Pakhna marls.

Chemical Analyses of the Alashiya Letters and Selected Cypriot Clays

We supplemented the results of the petrographic study with a chemical analysis, but did not carry out additional NAA study to the one conducted by Artzy et al.[73] The chemical analysis was therefore aimed at disclosing the elemental compositions of the tablets and comparing them with the relevant Cypriot clay types that were suggested by the petrographic results.

Table 2 presents the elemental composition of several Alashiya letters, as revealed by ICP-AES/MS. For two of the tablets we were able to extract only a limited sample—60 mg each for EA 34 and EA 37. This may have had some effect on the accuracy of the measurements, especially for EA 37, though the results indicate that the concentrations of most elements are presented in true numbers (except for P and Co). Therefore, this deficiency did not affect the results severely. We could not examine RS L.1 because it was immersed in glue in the process of conservation. The NAA study revealed that EA 33, 34, 35, and 38 were chemically very similar.[74] In light of this observation we found no point in examining EA 35 in the British Museum and EA 38 in the Vorderasiatisches Museum in Berlin; they were obviously produced of a similar clay type. Though our chemical analyses disclosed some differences in the chemical composition of EA 33 and 34, the results are closely related.

In order to cross-examine the petrographic results, we sampled marl of the Pakhna formation and clay of the Moni Mélange in various locations between Kouklia *Palaeopaphos* and Larnaca. In addition, we collected a few samples of the pillow lava and dolerite-derived clay that are still used today in the workshops of Kornos and Phini (table 1). By measuring the elemental composition of the Pakhna marl from several outcrops, preferably near the relevant Late Cypriot sites, we hoped to identify differences between the various locations, and accordingly to suggest a better-refined origin for EA 33 and EA 34. Similarly, we wished to check the likeness between EA 37 and the clay of the Moni Mélange in its limited area of distribution.[75]

Using logarithms of the measured concentrations, the relations between the analyzed specimens may be examined by cluster analysis. The Alashiya tablets cluster with the Cypriot clays: EA 33 and EA 34 cluster with samples of the Pakhna marl, while EA 37 clusters with samples of the Moni Mélange (fig. 6). It becomes evident that the Pakhna formation includes two differing marl categories. One (represented in our collection by samples CY-8, 9, 11, 14) has excellent plasticity and bright (even whitish) color. This type was not utilized for the

[70] Pantazis 1967, 64–6.

[71] Pantazis 1967, 65; Gass et al. 1994, 119.

[72] S. Vaughan, pers. comm.

[73] Artzy et al. 1976.

[74] Artzy et al. 1976.

[75] The samples were collected using a set of detailed geological maps of Cyprus. A satellite global positioning system (GPS) was used to record their grid references. The clay samples were formed into small briquettes, dried at room temperature, and fired at 500°C. The fired briquettes were then thin-sectioned and examined petrographically to compare with the tablets. While doing this, we attempted to estimate the workability of each sample by assessing its plasticity and its behavior during drying and firing. The Pakhna marl and Moni Mélange clay samples were analyzed by ICP-AES/MS. Samples that proved to be absolutely unworkable were not included in the ICP analysis.

production of tablets. The letters belong to a second marl category within the same formation, which is typified by good plasticity (though it is not as "fat" as the former type) and a more creamy color. Within this subgroup, both EA 33 and EA 34 are most closely related with sample CY-10 from right above the site of Alassa *Paliotaverna.* The other samples (from Kouklia, Kalavasos, and Kofinou) are more remote, although they are closely related to each other.

These results do not necessarily mean that EA 33 and EA 34 were made in Alassa *Paliotaverna.* The fact that the samples from Kouklia *Palaeopaphos* and Kalavasos *Ayios Dhimitrios,* both from within this clay member of the Pakhna formation, are closely related means that the formation is extremely homogeneous in its composition over broad areas. We can only establish that EA 33 and EA 34 (and the like) were made of a member of the Pakhna formation that exposes in various locations between Larnaca and Kouklia. Thus, although the ICP analysis indicated the relation of EA 33 and EA 34 to a certain member of the marl unit within the Pakhna formation, the homogeneity of this member over southern Cyprus prevented the identification of a more specific provenance for the tablets.

In order to investigate the reason for the preference of the less plastic, creamy marl over the brighter and more pliable one, we simulated the production of a tablet-like shape and its incision with a sharpened stick. This experiment made it obvious that incising cuneiform signs in wet, very plastic clay is very frustrating; the very plastic type of clay tends to cling to the stick and make unclear signs. The moderate plasticity of the clay was a desired trait that scribes must have been aware of when preparing the tablets for writing.

Tablet EA 37 clearly falls within the cluster of the Moni Mélange samples that come from pure outcrops of this formation. Sample CY-23, which is reworked under the overlaying Lefkara formation, is more related with the pure sample of the Lefkara formation (CY-2). Therefore, although too small in size, the sample taken from EA 37 confirms the petrographic interpretation that associated it with this clay type. Of the Moni clay samples only CY-19 showed good plasticity. We therefore suggest that the clay that had been selected for EA 37 was taken from a field rather than from an in situ exposure of the clay.

DISCUSSION

The Government of Cyprus in the Late Bronze Age: An Overview of Current Opinions

It is widely accepted that the political system of Late Bronze Age Cyprus should be reconstructed on its own terms without a priori reference to the palatial polities of the ancient Near East or the Aegean.[76] In addition, since the archaeological record changed considerably toward the Late Cypriot IIC (13th century B.C.), Peltunberg[77] and Knapp[78] warned against extrapolation back into the Middle Cypriot III–Late Cypriot IIB periods (17th–14th centuries B.C.), and envisaged diachronic political changes during the Late Cypriot period.

The key issue for this discussion has always been copper production—the economic backbone of Cyprus in antiquity. The earliest commercial exploitation of Cypriot copper ores took place along the northern rim of the Troodos Mountains at the beginning of the second millennium B.C. Although the main settlements along the northern coast of the island are still unexcavated, the rich cemeteries of Lapithos *Vrysi tou Barba,* Bellapais *Vounous,* Vasilia *Kaphkalla,* and Karmi *Palealona* testify to their economic importance. Indeed, all known imports into Cyprus during this period—from the Aegean, the Levant, and Egypt—were found in these four sites, considered to be the primary foci for external trade.[79]

During the first half of the second millennium B.C., however, the center of gravity of both settlement and economy shifted from the northwest to the central and eastern parts of the island. This is clear from the clusters of settlements at the northeastern foothills of the Troodos Mountains south of Nicosia, and in the eastern Mesaoria, as well as from the heavy concentration of Near Eastern imports in these regions. It is certainly not a coincidence that the early references to copper from Alashiya in Syrian and Babylonian cuneiform documents appear at the same time (late 19th–17th centuries B.C.).[80] Kalopsidha might have been the main Middle Cypriot gateway for copper export to the Levant. The archaeological record suggests that in the early part of the Late Bronze Age (Middle Cypriot III–Late Cypriot I, ca. 1700–1400 B.C.) Enkomi *Ayios Iakovos* replaced it as the most important site in eastern Cyprus.

---

[76] See, e.g., Knapp 1996a, 4; Peltunberg 1996, 27; see, however, Åström 1966, 10, 12.

[77] Peltunberg 1996, 28.

[78] Knapp 1996b, 67–9.

[79] Knapp 1994, 418–9.

[80] Courtois 1986; Knapp 1996a, 5; Keswani 1996, 219.

Table 1. Cypriot Clays Sample List

Sample	Formation	Location	Grid (UTM)[a]	Ceramic Behavior	Comments
CY-1	Pakhna	Khirokitiya	053152.385061	Insoluble in water	Near the site
CY-2	Lefkara	Khirokitiya	053038.385104	Moderate plasticity, dries without cracking, slightly sinters at 500°C	In the village
CY-3	Pakhna	Khirokitiya	053149.384938	Gritty, plastic but crumbles in drying	In the village
CY-4	Pakhna	Near Kofinou	053283.385189	Good plasticity, slightly cracks in drying, sinters at 500°C	
CY-5	Pakhna		053156.384780	Insoluble in water	
CY-6	Pakhna	Amathus	051261.384102	Insoluble in water	Car parking near the Agora
CY-7	Pakhna	West of Kourion	048817.383664	Insoluble in water	Road section
CY-8	Pakhna	Alassa *Pano Mandilaris*	049250.384700	Excellent plasticity, dries without cracking, sinters at 500°C	
CY-9	Pakhna	Alassa *Paliotaverna*	049295.384630	Excellent plasticity, dries without cracking, sinters at 500°C	Section of the northern wall foundation trench
CY-10	Pakhna	Alassa cardboard factory	049240.384700	Good plasticity, dries without cracking	North of *Paliotaverna*, from a section
CY-11	Pakhna	Alassa cardboard factory	049240.384700	Excellent plasticity, dries without cracking, sinters at 500°C	North of *Paliotaverna*, from a section
CY-12	Pakhna	Kalavasos	052648.384453	Good plasticity, dries without cracking, sinters at 500°C	Near the old road crossing the site (east of *Ayios Dhimitrios*)
CY-13	Pakhna	Road section	053149.384863	Rather gritty, good plasticity, dries without cracking, cracks at 500°C	
CY-14	Pakhna	Kouklia	046059.384086	Excellent plasticity, dries without cracking, sinters at 500°C	
CY-15	Pakhna	Kouklia	046050.384088	Good plasticity, dries without cracking, sinters at 500°C	
CY-16	Pakhna	Kouklia	046073.384098	Insoluble in water	
CY-17	Doleritic reworked clay	Kato Platres	048668.385999	Gritty but plastic, dries without cracking	Upper (humic) layer from a road section
CY-18	Dolerite derived clay	Phini	Village	Excellent plasticity, perfect sintering at 500°C	Potter's workshop clay, said to be locally collected

Table 1. Cypriot Clays Sample List (*Continued*)

Sample	Formation	Location	Grid (UTM)[a]	Ceramic Behavior	Comments
CY-19	Moni	SE of Pentacomo	052250.384300	Good plasticity, shrinks in drying, sinters at 500°C but slightly cracks	From a mining area, section
CY-20	Moni	SE of Moni	051900.384350	Moderate plasticity, cracks while drying, crumbles in firing to 500°C	
CY-21	Moni	SE of Moni	051900.384325	Moderate plasticity, cracks while drying, crumbles in firing to 500°C	
CY-22	Moni	Pentacomo	052218.384453	Moderate plasticity, cracks while drying, crumbles in firing to 500°C	
CY-23	Moni	West of Moni	051785.384229	Good plasticity, dries without cracking, sinters at 500°C	Reworked under the Lefkara formation
CY-24	Dolerite/ pillow lava derived clay	Kornos	Village	Excellent plasticity, dries without crumbling, perfectly sinters at 500°C	Potter's workshop clay (said to be from near Stravovouni)

[a] GPS extracted locations are in Universal Transverse Mercator (UTM) grid, zone 36, International Spheroid European Datum.

About the same time that Enkomi was established as a center on the eastern coast of the island (ca. 1600 B.C.), *Toumba tou Skourou* was founded as the main center of the Morphou Bay. Only scant remains of metallurgical activity were discovered at this site, however, as compared to the proliferation of such remains at Enkomi, found already in its early phases (though it should be remembered that large parts of *Toumba tou Skourou* were bulldozed away prior to excavation).[81] Thus, it appeared to many that in the beginning of the Late Bronze Age Enkomi controlled the copper industry of the entire island and served as its main seat of power.[82] The emergence of Enkomi as a new and dominant center may have been accompanied by the establishment of a network of hinterland forts aimed to secure control of the mines and the communication lines connecting them to the coastal gateway.[83] Merrillees,[84] and especially Keswani,[85] advocated against the existence of a unified, island-wide polity founded and dominated by a paramount center at Enkomi. Peltunberg refuted their arguments on the ground that they pertain to the situation in the later part of the Late Cypriot period.[86]

Most scholars have argued that the political situation in Cyprus did not change during the 15th–14th centuries B.C. and is still reflected in the Amarna tablets. They have suggested that a king, most probably seated at Enkomi, controlled the copper production of the island and participated in the international trade in the eastern Mediterranean.[87]

The political and economic situation seems to have changed considerably in the Late Cypriot IIC period (13th century B.C.). New data from recent fieldwork points to fragmentation of central authority. Many urban sites, some of them much larger than Enkomi, were established, mainly along the southern coast.[88] Their monumental ashlar architecture, large storage facilities, industrial installations for olive oil and copper processing, administrative technology (e.g., seal impressions and Cypro-Minoan inscriptions), as well as rich burials, seem to indicate that they must have been centers of regional polities and the seat of local elite. It has therefore been suggested that power and the island's resources were shared in the post-Amarna period by a group of peer-polities.[89]

[81] Keswani 1996, 220–1.

[82] Muhly 1989, 299; Peltunberg 1996, 29–35; Knapp 1993, 99; 1996b, 67; 1997, 65.

[83] Peltunberg 1996, 30–3.

[84] Merrillees 1992.

[85] Keswani 1993; 1996, 234.

[86] Peltunberg 1996, 28; see also Knapp 1997, 48–9.

[87] E.g., Knapp 1997, 65–6.

[88] Negbi 1986; Åström and Herscher 1996.

[89] See, e.g., Muhly 1989, 301–3; Peltunberg 1996, 28, 36; Knapp 1996b, 68; 1997, 66–8.

Since the political reconstruction, which has just been delineated, suggests that the focus of power in Cyprus had continuously shifted during the second millennium, scholars reason that Alashiya may have been a designation for the entire island rather than a name of a city.[90]

In a few texts, Alashiya appears with the URU determinative. But in certain cases, scribes who worked in the peripheral kingdoms did not distinguish between determinatives, and sometimes used URU, or KUR.URU, for KUR. An examination of all the references where Alashiya appears with the URU determinative reveals that no single text refers unequivocally to a city. In other words, a town named Alashiya is not borne out by the textual evidence.[91] We conclude that Alashiya was a name for the island of Cyprus, or sometimes (possibly) for a part of it. Whether a certain city was also called Alashiya cannot be established.

The Political Center of Alashiya during the 14th–13th Centuries B.C. according to the Analytical Results

The petrographic and chemical results presented above make it possible to attribute all the Alashiya letters that we examined to the southeastern margins of the Troodos Mountains. Before we try to locate a possible candidate site for the origin of the Alashiya tablets, we must review the conventional identification of the capital of Alashiya in Enkomi.

A general look at the geological map of Cyprus[92] reveals that Pleistocene to Holocene sands, silts, and sedimentary calcareous rocks, including mainly biocalcarenites and marl, characterize the whole area of eastern Cyprus, and Enkomi in particular. Thus the source materials of the tablets are far beyond the exploitable ranges of Enkomi, Kalopsidha, or in fact any other site in the eastern part of the island. But is it possible that carefully selected clay sources were imported to Enkomi from other parts of the island in order to produce clay tablets? This possibility—raised by V. Karageorghis in a discussion of our results—cannot be dismissed on petrographic considerations alone. Nonetheless, we are confident that this is not the case for three reasons.

First, the local marl at Enkomi is highly suitable for tablet production under the restrictions that we suggested above, that is to say, high plasticity, low shrinkage, light color, and no inclusions. Creamy color and fine texture distinguish the pottery produced at Varosi, the Greek quarter of Famagusta. Potters who fled from Varosi during the civil war in Cyprus testify that one of their main sources for the high quality "white earth" was at Enkomi.[93] Therefore, we see no reason why a scribe should prefer remote sources of clay to this high quality and easily available source.

Second, while the locally produced pottery and Cypro-Minoan tablets at Enkomi are characterized by a fine texture and light shades, EA 37 and RS L.1 are dark in color and contain coarse inclusions. The scribes who produced these two tablets no

Table 2. Elemental Analysis of the Alashiya Letters

A. Major Elements (in weight/percent)

Element	EA 33	EA 34	EA 37
SiO_2	41.86	38.25	41.51
Al_2O_3	9.66	8.42	9.87
CaO	18.79	17.51	10.86
MgO	2.39	1.88	1.78
Fe_2O_3	4.28	3.99	5.43
TiO_2	0.55	0.50	0.63
P_2O_5	0.21	<0.2	<0.3
SO_3	0.64	0.60	0.64

B. Minor and Trace Elements (PPM)

Element	EA 33	EA 34	EA 37
Zn	52.24	55.46	57.17
Co	16.70	<10	<15
Ni	80.21	91.67	69.08
Ba	142.59	175.00	315.79
Mn	523.15	454.17	480.26
Cr	87.94	128.33	123.03
V	98.94	77.92	101.32
Be	1.72	1.38	1.71
Cu	111.35	38.96	49.93
Sr	417.34	410.00	221.05
La	23.45	26.54	35.07
Y	18.10	19.50	27.37
Ce	50.33	45.15	46.24
Pr	6.82	6.06	7.01
Nd	25.45	22.16	26.97
Sm	4.76	4.14	5.33
Eu	0.91	0.85	1.10
Tb	0.65	0.62	0.86
Dy	3.66	3.67	4.65
Ho	0.87	0.73	0.94
Tm	0.37	0.30	0.37
Yb	2.10	2.02	2.46
Lu	0.28	0.28	0.34

[90] Cf. Masson 1973; Knapp 1996a, 8.

[91] Knapp 1985, 236–7; 1990, 779; 1996a, 4; Na'aman 1997, 611. It may be noted that the colophon in KTU 4.102 (Walls 1996a, 40) is broken on both sides. It is possible that a KUR sign appeared on the left side, or that a post-determinative KI sign appeared on the right side (as restored in KTU).

[92] 1:250,000, 1995 ed.

[93] Ionas 1998, 133.

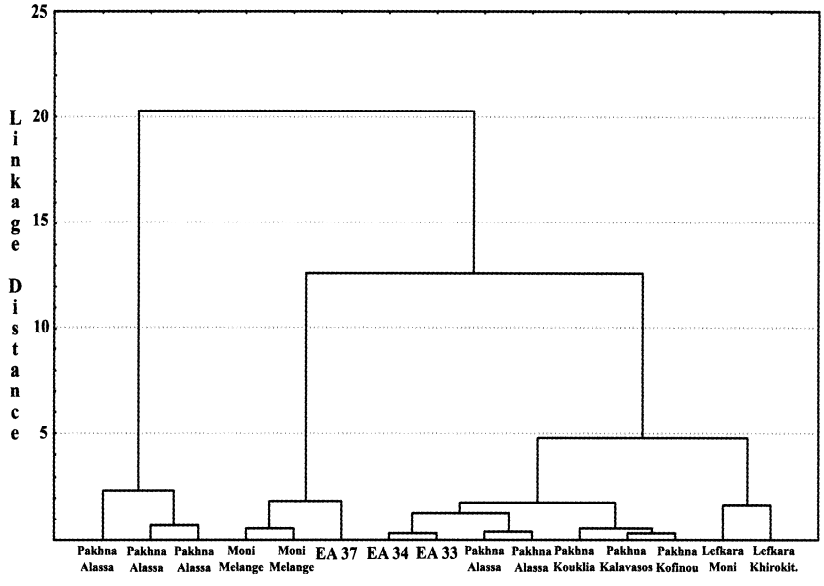

Fig. 6. Cypriot clay samples and the Alashiya letters, tree diagram, Ward's method, squared Euclidean distances

doubt selected the clay—which typifies the margins of the Troodos—in hand.

Third, all the Alashiya tablets discussed here differ drastically in their materials from the tablets found at Enkomi. The Enkomi tablets that we examined cover a time-span of ca. 300 years, which overlaps the periods of the Amarna and Ugarit letters, and display an extremely homogenous composition. It is clear that the raw material selected for tablet production at Enkomi remained the same throughout those periods.

Combined, these factors suggest that the Alashiya tablets from Amarna and Ugarit were produced far from the Enkomi region (as already hinted by the NAA study of the Berkeley team[94]). Further examination of the southwestern margins of the Troodos Mountains is warranted in order to locate the place from which the Alashiya tablets were sent. The two different clay types that were used for the production of the Alashiya tablets, namely the predominantly calcareous fabric derived from the Miocene Pakhna marls and the igneous-derived clays from the ophiolite margins, can be interpreted in two different ways. They can be understood as representing two different sources of clay for the tablets, or a single location where both clay types were used simultaneously. Since the igneous-derived tablets were also made in the contact zone with the sedimentary area where both clay types are exposed in near proximity, the second possibility should be favored. Indeed, in sites located on the margins of the Troodos, this twofold use of clay types for pottery production was customary from the Early Bronze Age through the Late Bronze Age.[95] Therefore, it is very likely that all the Alashiya letters originated from a single site.

The combination of Pakhna marl and the Moni Mélange clay is limited in distribution. In the immediate area where the Moni formation is exposed there are only a few large Late Cypriot II sites that may have served as administrative centers. These include first and foremost Kalavasos *Ayios Dhimitrios* and Amathus. Maroni *Vournes* (on the coast) and Alassa *Paliotaverna/Pano Mandilaris* (in the piedmont) are located in an exploitable range of 10 km, where Moni clays and Pakhna marls are bounded in the CTF (Clay-Temper Factor, above). Adding the doleritic-derived clay of RS L.1 as another possible resource (though in a tablet sent about a century later than the Amarna letters) does not change this picture significantly, though it makes the coastal sites (Maroni and Amathus) less probable.

Historical and archaeological data help to narrow the possibilities. The historical sources indicate that copper played a major role in the relations between Alashiya and its eastern neighbors. A site that is directly related to copper production may therefore be favored. In the area limited by the

[94] Artzy et al. 1976.

[95] Barlow and Idziak 1989; Vaughan 1991, 353–4; Weisman 1996; Barlow and Vaughan 1999.

distribution of the above clay types, the sites of Kalavasos and Alassa are the best candidates to answer this description. Maroni *Vournes*, though located only several kilometers east of Kalavasos, is a coastal site, too remote from the Troodos margin zone.

Kalavasos *Ayios Dhimitrios* is situated in the Vasilikos Valley, northeast of the Akrotiri Bay. It is located in an area of exposure of the Lefkara formation of the Paleogene age, dominated by chalks and marls,[96] and is adjacent to the Kalavasos copper mines of the southeastern corner of the Troodos massif. Imposing ashlar masonry, as well as extensive evidence for olive oil production and storage facilities, make this site identifiable as a major administrative center.[97] It flourished in the Late Cypriot IIC, though excavations beneath and around ashlar Building X indicated that it was occupied already in the Late Cypriot IIA. The interpretation of this site as a major center is corroborated by the evidence from the tombs, which exhibit the wealth and international contacts enjoyed by the local elite. Though located not far from the coast, Kalavasos *Ayios Dhimitrios* is close to the volcanic complex of the Troodos massif. Therefore it is suitable for the identification of the origin of EA 37.

The site of Alassa *Paliotaverna/Pano Mandilaris* was discovered in 1983 in the course of a salvage survey prior to the construction of the Kouris dam. The excavations exposed a considerable Late Cypriot IIC–Late Cypriot IIIA site, the only one in the hilly, or mountainous zone of the Troodos piedmont excavated thus far.[98] The site is situated in proximity to an area rich in sulfide ores and other copper alloys, and the excavations revealed rich evidence for metallurgical activities.[99] At *Paliotaverna*, impressive architecture characterized by ashlar masonry was exposed, dating mainly to the 13th century B.C.,[100] but apparently showing indications of 14th-century B.C. activity as well. The pottery from the foundation trenches of Building I is attributed to the Late Cypriot II.[101] New ^{14}C dates seem to support a 14th-century B.C. date for the foundation of building II.[102] Moreover, the long sequence of the burials from Alassa *Pano Mandilaris* starts at Late Cypriot IB.[103] The imposing architecture and the impressive storage facilities for olive oil (i.e., pithoi, some bearing seal impressions), indicate that the site was a major administrative center.[104]

Geologically, the site of Alassa is located in an area dominated by the Pakhna formation. The first exposures of the pillow lava series appear only several kilometers to its north, and the westernmost margins of the Moni formation can be found at Yerasa, 10 km to the northeast. In terms of CTF these clays are within the exploitable territory of the site.

CONCLUSIONS: THE ORIGIN OF THE ALASHIYA TABLETS

Our analysis proves that Alashiya, acknowledged in the Amarna correspondence as a member in the "club" of great powers of the Late Bronze Age,[105] must be located in Cyprus. It also indicates that the political and administrative center of Alashiya in the 14th–13th centuries B.C. was situated in the mountainous region of the island.[106]

The similarity between the ancient name Alashiya and modern Alassa may help to bolster this argument;[107] however, this similarity cannot decisively identify the location of Alashiya. The name Alashiya designated a vast area, and it could have been preserved in any part of the island. Even if preserved in the name Alassa, it would point only to a general area in which the political center of the island could have been located.

Some textual evidence lends support to the identification of the capital of Alashiya in the mountainous area, away from the coast. Letter RS 20.18 was sent by Eshuwara, the chief prefect of Alashiya, to the king of Ugarit. It was probably written at the same time as RS L.1, in the last days of Ugarit. In the rele-

---

[96] Gass et al. 1994, 115–9.

[97] South 1996, 1997.

[98] Hadjisavvas 1989, 1996.

[99] Hadjisavvas 1989.

[100] Hadjisavvas 1996.

[101] Hadjisavvas 1996, 28, 32.

[102] S. Hadjisavvas, pers. comm.

[103] Hadjisavvas 1991.

[104] Hadjisavvas 1996, 34–6.

[105] For the diplomatic rhetoric of the day, see Zaccagnini 1987, 61–5.

[106] The four of us could not reach a consensus on the exact origin of the Alashiya letters. With no more information at hand, Bunimovitz tends to leave the exact identification open between Kalavasos and Alassa. Finkelstein, Goren, and Na'aman prefer the site of Alassa. It is an imposing site, with evidence of administrative activity; it is located close to the copper mines of the southern Troodos; and it is situated in an ideal place to control both the mountainous, inland areas of the Troodos and the centers and harbors of the coast. Whoever rules in Alassa controls the flow of commodities between the Troodos and the coast.

[107] Courtois, as quoted by Hadjisavvas (1996, 23). Note that in a Phoenician-Cypriot bilingual text of the fourth century B.C., the god Reshcph carries the epithet 'Alhyts (in Phoenician), or Alasiotas (in Cypriot), i.e., from the place-name 'Alasios (Walls 1996b, 60). The possible similarity of fourth-century 'Alasios and modern Alassa is self-evident.

vant passage (lines 16–28), Eshuwara reports of a threat to his place, located in a mountainous area, which was avoided because the 20 ships of the enemy moved on to threaten Ugarit: "But now, (the) twenty enemy ships—even before they would reach the mountain—have not stayed around but have quickly moved on, and where they have pitched camp (?) we do not know. I am writing you to inform and protect you. Be aware!"[108] Having Enkomi in mind, scholars have translated "the mountain (shore)." One should follow the verbal translation "mountain," however, because there is no "shore" in the text. This evidence fits the location of the Alashiyan political-administrative center at Alassa or Kalavasos, as established by the petrographic study.

Other textual references to Alashiya indicate that, in addition to the need to keep a close eye on copper production, ongoing security problems at the coastal regions of the island may have dictated an inland location for its capital. In the famous Hittite "Indictment of Madduwatta" text, which is dated to the end of the 15th century B.C., we read of pirates' raids on Alashiya by people from western Anatolia.[109] A few generations later, the king of Alashiya complains that Lukkians (people from Lycia in southwestern Anatolia) continuously raid his villages.[110] Apparently, hostages were the main booty of these sea-born raids.[111] Christodoulou has noted that fear from piracy or invasion inhibited coastal Cypriot villages in some later periods as well.[112]

Sociopolitical Organization of LBA Cyprus

Keswani[113] and Knapp[114] proposed updated reconstructions of the settlement hierarchy in Late Bronze Age Cyprus constructed on Catling's seminal threefold division of Late Cypriot settlement system and economy: (A) coastal industrial, administrative, and trading urban centers; (B) inland rural settlements; (C) copper production sites at the Troodos foothills.[115] The essence of their models, which added to the settlement structure proposed by Catling the important category of ceremonial or "sanctuary" sites, has served as a tentative explanation of how subsistence goods, raw materials, and luxury items were produced, distributed, transported, and administered within the Late Cypriot settlement system. Interwoven within these models are suggestions about the sociopolitical and economic mechanisms (e.g., staple/wealth finance) that integrated a variety of functionally different sites on a regional scale. Both scholars, however, have emphasized the dynamic nature of their constructs, whose configuration and elements must change as new data emerge.[116] Knapp noticed that Kalavasos and Alassa, defined in the above model as "primary" centers, do not conform to the "ideal type" of such centers and are unique in their multiplicity of functions.[117] Closer to the copper mines than "primary" coastal centers, these two sites must have controlled the mining, production, and transport of copper and served as centers of commercial administration. Knapp further suggested that Maroni *Tsaroukkas* and Kourion *Bamboula* could have served as intermediary coastal sites for these inland centers (Kalavasos and Alassa, respectively).[118]

Three alternative models for Cypriot sociopolitical organization are proposed in light of the present evidence.

The first model proposes a single centralized authority for the island polity of Alashiya during the 16th–13th centuries B.C. The seat of power had been located in the mountainous area throughout this period, but the pre-14th-century center has not been located yet.

The second model acknowledges a single centralized authority for Alashiya during the 16th–13th centuries B.C., but argues that the location of the center of power within this polity and its internal organization have changed in the course of time. Possibly emerging about 1600 B.C., together with the establishment of Enkomi, the rulers of Alashiya may have established their government at this early stage over the eastern part of the island if not already throughout the island. As Dikaios claimed, copper ores could have been transported to Enkomi from the Skouriotissa mines, which lie on the northern foothills of the Troodos.[119] Other coastal urban centers emerged later, and one may wonder if their foundation was initiated by the central government or by the local elites. Because of their lack of storage facilities and reliance on transport from the hinterland, the coastal cities must have been

[108] Nougayrol et al. 1968, no. 22; Hoftijzer and van Soldt 1998, 343.
[109] Bryce 1989, 298–9; Beckman 1996, 31.
[110] EA 38; Moran 1992, 111–2.
[111] Wachsmann 2000, 103–4.
[112] Christodoulou 1959, 62.
[113] Keswani 1993.
[114] Knapp 1996b, 1997.
[115] Catling 1962, 144–5; 1975, 189–93.
[116] Keswani 1993, 79–80; Knapp 1996b, 66–7.
[117] Knapp 1997, 61.
[118] Knapp 1997, 61–2.
[119] Dikaios 1969, 11.

integrated within the overall settlement and economic system for their livelihood. In the late 15th century to the beginning of the 14th century B.C., the main seat of power moved inland to Alassa (Finkelstein, Goren, and Na'aman), or to Kalavasos/Alassa (Bunimovitz). Four letters sent from Alashiya to Niqmaddu III of Ugarit (ca. 1225/20–1215 B.C.) were recently discovered, one of them dispatched by a king of Alashiya named Kushmeshusha.[120] It seems, therefore, that the picture of political fragmentation in 13th-century B.C. Cyprus is exaggerated, if not completely wrong. The unprecedented urban flourishing during the Late Cypriot IIC reflects the expansion of the commercial system in the eastern Mediterranean region and the success of the Alashiyan rulers in capitalizing on the expanding commerce. Enkomi continued to serve as a gateway community for the Cypriot copper trade with the Levant.

According to the third model, Alashiya comprised a number of competing regional factions or a federation of such independent polities.[121] However, since Near Eastern rulers of the 14th–13th centuries B.C. acknowledged a king of Alashiya, who according to our research was situated in Alassa or Kalavasos, he must have been either the overlord of the other Cypriot polities or a primus inter pares.

It is difficult to decide which of the above scenarios is closer to the Late Cypriot reality. The confirmation of the identification of Alashiya with Cyprus and the location of its capital in the mountainous inland region are essential steps in the process of unraveling the complicated picture of the government of Cyprus in the Late Bronze Age. Many questions are still to be answered. In the meantime we may be comforted by Cadogan's optimistic view: "it is a good sign that Late Cypriot society and history become ever more complicated to explain. It means that we are coming a little closer to the realities of those days."[122]

DEPARTMENT OF ARCHAEOLOGY AND ANCIENT
NEAR EASTERN CULTURES
TEL AVIV UNIVERSITY
RAMAT AVIV 69978
ISRAEL
YGOREN@POST.TAU.AC.IL
BUNIMOV@POST.TAU.AC.IL
FINK2@POST.TAU.AC.IL
NNAAMAN@POST.TAU.AC.IL

[120] Yon 1999, 118; Malbran-Labat 1999, 122.
[121] See Merrillees 1992; Keswani 1993, 1996.
[122] Cadogan 1996, 15.

Works Cited

Artzy, M., I. Perlman, and F. Asaro. 1976. "Alashiya of the Amarna Letters." *JNES* 2:171–82.

Åström, P. 1996. "Hala Sultan Tekke: A Late Cypriote Harbour Town." In *Late Bronze Age Settlement in Cyprus: Function and Relationship*, edited by P. Åström and E. Herscher, 9–14. *SIMA-PB* 126. Jonsered: Paul Åström.

Åström, P., and E. Herscher, eds. 1996. *Late Bronze Age Settlement in Cyprus: Function and Relationship. SIMA-PB* 126. Jonsered: Paul Åström.

Bagnall, P.S. 1960. "The Geology and Mineral Resources of the Pano Lefkara–Larnaca Area." *Memoirs of the Geological Survey of Cyprus* 5:1–116.

Barlow, J.A., and P. Idziak. 1989. "Selective Use of Clays at a Middle Bronze Age Site in Cyprus." *Archaeometry* 31:66–76.

Barlow, J.A., and S. Vaughan. 1999. "Breaking into Cypriot Pottery: Recent Insights into Red Polished Ware." In *Maletemata: Studies in Aegean Archaeology Presented to Malcolm H. Wiener as He Enters His 65th Year*, edited by P. Betancourt, V. Karageorghis, R. Laffineur, and W.-D. Niemeier, 15–20. *Aegaeum* 20. Liège: Université de Liège.

Beckman, G. 1996. "Hittite Documents from Hattusa." In *Near Eastern and Aegean Texts from the Third to the First Millennia* B.C., edited by A.B. Knapp, 31–5. Sources for the History of Cyprus, edited by P.W. Wallace and A.G. Orphanides, vol. 2. Nicosia: Greece and Cyprus Research Center.

Bingöl, A.F. 1978. "Pétrologie du massif ophiolitique de Pozanti-Karsanti (Taurus cilicien, Turkie): étude de la partie orientale." Thèse 3e cycle, Université Strasburg.

Braidwood, R.J., and L. Braidwood. 1960. *Excavations in the Plain of Antioch* I. Chicago: Oriental Institute.

Bryce, T.R. 1989. "Ahhiyawans and Mycenaeans: An Anatolian Viewpoint." *OJA* 8:297–310.

Cadogan, G. 1996. "Maroni: Change in Late Bronze Age Cyprus." In *Late Bronze Age Settlement in Cyprus: Function and Relationship*, edited by P. Åström and E. Herscher, 15–22. *SIMA-PB* 126. Jonsered: Paul Åström.

Catling, H. 1962. "Patterns of Settlement in Bronze Age Cyprus." *OpAth* 4:129–69.

———. 1964. *Cypriote Bronzework in the Mycenaean World.* Oxford: Oxford University Press.

———. 1975. "Cyprus in the Late Bronze Age." *CAH* II/2A. 3rd ed.:188–216.

Chevenoy, M. 1959. "Le substratum métamorphique des roches vertes dans Le Baër et Le Bassit (Syrie Septentrionale)." *Notes et Memoirs sur la Moyen-Orient* 7:1–18.

Christodoulou, D. 1959. *The Evolution of Rural Land Use Pattern in Cyprus.* The World Land Use Survey Regional Monograph No. 2. London: Geographical Publications.

Courtois, J.-C. 1986. "À Propos des Apports Orientaux dans la Civilisation du Bronze Récent à Chypre." In *Acts of the International Archaeological Symposium "Cyprus between the Orient and the Occident,"* edited by V. Karageorghis, 69–87. Nicosia: Department of Antiquities.

Dikaios, P. 1969. *Enkomi Excavations 1948–1958.* Vol. 1, *The Architectural Remains: The Tombs.* Mainz am Rhein: Philipp von Zabern.

———. 1971. *Enkomi Excavations 1948-1958.* Vol. 2, *Chronology, Summary and Conclusions, Catalogue, Appendices.* Mainz am Rhein: Philipp von Zabern.

Dubertret, L. 1955. *Géologie des roches vertes du nord-ouest de la Syrie et du Hatay (Turkie).* Notes et Memoirs sur la Moyen-Orient 6. Paris: ORSTOM.

Erendil, M. 1984. "Petrology and Structure of the Upper Crustal Units of the Kizildağ Ophiolite." In *Geology of the Taurus Belt: Proceedings,* edited by O. Tekeli and M.C. Göncüolu, 269–84. Ankara: MTA.

Franken, H.J., and A. Van As. 1994. "Potters Who Used Euphrates Clay." *Mesopotamian History and Environment Occasional Publications* 2:507–18.

Gass, I.G. 1980. "The Troodos Massif: Its Role in the Unraveling of the Ophiolite Problem and Its Significance in the Understanding of Constructive Plate Margin Process." In *Ophiolites: Proceedings International Ophiolite Symposium, Cyprus 1979,* edited by A. Panayiotou, 23–35. Nicosia: Cyprus Geological Survey Department.

Gass, I.G., C.J. MacLeod, B.J. Murton, A. Panayotou, K.O. Simonian, and C. Xenophontos. 1994. *The Geology of the Southern Troodos Transform Fault Zone.* (Memoir No. 9) Nicosia: Cyprus Geological Survey Department.

Goren, Y., I. Finkelstein, and N. Na'aman. Forthcoming. *Inscribed in Clay I: Provenance Study of the Amarna Tablets and Other Ancient Near Eastern Texts.* Tel Aviv: Institute of Archaeology, Tel Aviv University.

Hadjisavvas, S. 1989. "A Late Cypriote Community at Alassa." In *Early Society in Cyprus,* edited by E. Peltenberg, 32–42. Edinburgh: Edinburgh University Press.

———. 1991. "LC IIC to LC IIIA Without Intruders: The Case of Alassa-*Pano Mandilaris.*" In *Cypriot Ceramics: Reading the Prehistoric Record,* edited by J. Barlow, D.L. Bolger, and B. Kling, 173–80. University Museum Symposium Series 2, University Museum Monograph 74. Philadelphia: A.G. Leventis Foundation, University of Pennsylvania Museum.

———. 1996. "Alassa: A Regional Center of Alasia?" In *Late Bronze Age Settlement in Cyprus: Function and Relationship,* edited by P. Åström and E. Herscher, 23–38. *SIMA-PB* 126. Jonsered: Paul Åström.

Hall, H.R. 1913. "The Land of Alashiya and the Relations of Egypt and Cyprus under the Empire (1500–1100 B.C.)." *Journal of the Manchester Egyptian and Oriental Society* 2:33–45.

Hampe, R., and A. Winter. 1962. *Bei Töpfen und Töpferinnen in Kreta, und Zypern.* Mainz: Verlag des Römisch-Germanischen Zentralmuseums.

Hellbing, L. 1979. *Alasia Problems. SIMA* 57. Göteborg: Paul Åström.

Hoftijzer, J., and W.H. van Soldt. 1998. "Appendix: Texts from Ugarit Pertaining to Seafaring." In *Seagoing Ships & Seamanship in the Bronze Age Levant,* by S. Wachsmann, 333–44. London: Chatham.

Holmes, Y.L. 1971. "The Location of *Alashiya.*" *JAOS* 91:426–9.

Ionas, I. 1998. *Pottery in the Cyprus Tradition.* Nicosia: Cyprus Research Centre.

Karageorghis, V. 1970. "Chronique des fouilles et découverts archéologiques à Chypre en 1969." *BCH* 94:191–300.

Keswani, P.S. 1989. "The Pithoi and Other Plain Ware Vessels." In *Vasilikos Valley Project 3: Kalavasos-Ayios Dhimitrios II, Ceramics, Objects, Tombs, Specialist Studies,* edited by I.A. Todd, 12–21. *SIMA* 71:3. Göteborg: Paul Åströms.

———. 1993. "Models of Local Exchange in Late Bronze Age Cyprus." *BASOR* 292:73–84.

———. 1996. "Hierarchies, Heterarchies, and Urbanization Processes: The View from Bronze Age Cyprus." *JMA* 9:211–50.

Knapp, A.B. 1985. "Alashiya, Caphtor/Keftiu and Eastern Mediterranean Trade: Recent Studies in Cypriote Archaeology and History." *JFA* 12:231–50.

———. 1990. Review of *Alashiya Revisited,* by R.S. Merrillees. *BibO* 47:795–801.

———. 1993. "Social Complexity: Incipience, Emergence, and Development on Prehistoric Cyprus." *BASOR* 292:85–104.

———. 1994. "The Prehistory of Cyprus: Problems and Prospects." *Journal of World Prehistory* 8:377–453.

———, ed. 1996a. *Near Eastern and Aegean Texts from the Third to the First Millennia BC,* edited by P.W. Wallace and A.G. Orphanides. Sources for the History of Cyprus 2. Nicosia: Greece and Cyprus Research Center.

———. 1996b. "Settlement and Society on Late Bronze Age Cyprus: Dynamics and Development." In *Late Bronze Age Settlement in Cyprus: Function and Relationship,* edited by P. Åström and E. Herscher, 54–80. *SIMA-PB* 126. Jonsered: Paul Åström.

———. 1997. *The Archaeology of Late Bronze Age Cypriot Society: The Study of Settlement, Survey and Landscape.* Glasgow: University of Glasgow, Department of Archaeology.

Knudtzon, J.A. 1915. *Die el-Amarna Tafeln.* 1964 ed. Leipzig: J.C. Hinrichs.

London, G. 1986. "Ceramic Ethnoarchaeology in Cyprus." *American Schools of Oriental Research Newsletter* 38:9–10.

———. 1989. "A Comparison of Two Contemporaneous Lifestyles of the Late Second Millennium B.C." *BASOR* 273:37–55.

Malbran-Labat, F. 1999. "Nouvelles données épigraphiques sur Chypre et Ougarit." *RDAC*:121–3.

Mason, R.B., and L. Cooper. 1999. "Petrographic Analysis of Bronze Age Pottery from Tell Hadidi, Syria." *Levant* 31:135–47.

Masson, E. 1971. "Rouleau inscrit chypro-minoen trouvé à Enkomi en 1967." In *Alasia* I, edited by C.F.A. Schaeffer, 457–77. Paris: Librairie Klincksieck.

———. 1978. *Journal des Savants*:49–86.

———. 1983. "Premiers documents Chypro-Minoen du site Kalavasos-Ayios Dhimitrios." *RDAC*:131–41.

———. 1989. "Vestiges ecrits trouves sur le site de Kalavasos-Ayios Dhimitrios." In *Vasilikos Valley Project* 3: *Kalavasos-Ayios Dhimitrios II Ceramics, Objects, Tombs, Specialist Studies,* edited by I.A. Todd, 38–40. *SIMA* 71:3. Göteborg: Paul Åströms.

Masson, O. 1973. "Apropos de l'ile d'Alasia." *Kadmos* 12:98–9.

Merrillees, R.S. 1972. "Alasia." In *Proceedings of the First Cyprological Congress,* 111–9. Nicosia: Department of Antiquities.

———. 1987. *Alashiya Revisited.* Cahiers de la Reveue Biblique 22. Paris: J. Gabalda.

———. 1992. "The Government of Cyprus in the Late Bronze Age." In *Acta Cypria: Acts of the International Congress on Cypriote Archaeology Held in Göteborg on 22–24 August 1991*, pt. 3, edited by P. Åström, 310–28. *SIMA-PB* 120. Jonsered: Paul Åström.

Michaelidou-Nicolaou, I. 1980. "Regroupement de deux fragments de tablettes d'Enkomi avec écriture chypro-minoenne." *SMEA* 21:7–16.

Moran, W.L. 1992. *The Amarna Letters*. Baltimore: Johns Hopkins University Press.

Muhly, J.D. 1972. "The Land of *Alashiya*: References to *Alashiya* in the Texts of the Second Millennium BC and the History of Cyprus in the Late Bronze Age." In *Proceedings of the First International Cyprological Congress*, 201–19. Nicosia: Department of Antiquities.

———. 1989. "The Organization of the Copper Industry in Late Bronze Age Cyprus." In *Early Society in Cyprus*, edited by E.J. Peltenburg, 298–314. Edinburgh: Edinburgh University Press.

———. 1996. "The Significance of Metals in the Late Bronze Age Economy of Cyprus." In *The Development of the Cypriot Economy from the Prehistoric Period to the Present Day*, edited by V. Karageorghis and D. Michalides, 45–59. Nicosia: University of Cyprus and the Bank of Cyprus.

Na'aman, N. 1997. "The Network of Canaanite Late Bronze Kingdoms and the City of Ashdod." *UgaritF* 29:599–626.

Negbi, O. 1986. "The Climax of Urban Development in Bronze Age Cyprus." *RDAC*:97–121.

Nougayrol, J., E. Laroche, C. Virolleaud, and C.F.A. Schaeffer. 1968. *Ugaritica V, Nouveaux Textes Accadiens, Hourrites et Ugaritiques des Archives et Bibliothèques Privées d'Ugarit, Commentaires des Textes Historiques (Première Partie)*. Paris: Imprimerie Nationale.

Pantazis, T.M. 1967. *The Geology and Mineral Resources of the Pharmakas-Kalavasos Area*. Geological Survey Department of Cyprus Memoir no. 8. 1978 ed. Nicosia: Geological Survey Department.

Parrot, J.F. 1974. "L'assemblage ophiolithique du Baër-Bassit (nord ouest de la Syrie): Étude petrographique et geochemique du complexe filonien, des laves en coussins qui lui sont associees, et d'une partie des formations effusives du volcano- sedimentaire." *Cahier ORSTOM, Service Geologique* 6:97–126.

———. 1977. *Assemblage ophiolitique du Baër-Bassit et termes effisifs du volcano-sédimentaire*. Paris: ORSTOM.

Peltenburg, E.J. 1996. "From Isolation to State Formation in Cyprus, c. 3500–1500 B.C." In *The Development of the Cypriot Economy from the Prehistoric Period to the Present Day*, edited by V. Karageorghis and D. Michalides, 17–43. Nicosia: University of Cyprus and the Bank of Cyprus.

Robertson, A.H.F. 1986. "The Hatay Ophiolite (southern Turkey) in Its Eastern Mediterranean Tectonic Context: A Report on Some Aspects of the Field Excursion." *Ofioliti* 11:105–19.

Schubert, P. 1986. "Petrographic Modal Analysis: A Necessary Complement to Chemical Analysis of Ceramic Coarse Ware." *Archaeometry* 28:163–78.

Singer, I. 1983. "Western Anatolia in the Thirteenth Century B.C. According to the Hittite Sources." *AnatSt* 33:205–17.

———. 1999. "A Political History of Ugarit." In *Handbook of Ugaritic Studies*, edited by W.G.E. Watson and N. Wyatt, 603–733. Leiden: Brill.

South, A. 1996. "Kalavasos-*Ayios Dhimitrios* and the Organisation of Late Bronze Age Cyprus." In *Late Bronze Age Settlement in Cyprus: Function and Relationship*, edited by P. Åström and E. Herscher, 39–49. *SIMA-PB* 126. Jonsered: Paul Åström.

———. 1997. "Kalavasos-*Ayios Dhimitrios* 1992–1996." *RDAC*:151–75.

Tekeli, O., and M. Erendil. 1986. "Geology and Petrology of the Kizildağ Ophiolite (Hatay)." *Bulletin of the Mineral Resources and Exploration Institute of Turkey* 107:21–37.

Thierry, J. 1980. "Ophiolites of Turkey." *Ofioliti* 2:199–237.

Tolun, N., and H.N. Pamir. 1975. *1:500,000 ölçekli A Türkiye Jeoloji Haritalsi, Hatay (with explanatory notes)*. Ankara: Institute of Mineral Research and Exploration (Turkish and English).

Ulu, Ü. 1996a. *1:100,000 ölçekli Açinsama Nitelikli Türkiye Jeoloji Haritalari Serisi No 43, Suruç – L 25 Paftasi*. (Turkish with English abstract.) Ankara: Institute of Mineral Research and Exploration.

———. 1996b. *1:100,000 ölçekli Açinsama Nitelikli Türkiye Jeoloji Haritalari Serisi No 42, Urfa – K 25 Paftasi*. (Turkish with English abstract.) Ankara: Institute of Mineral Research and Exploration.

Vaughan, S. 1987. "A Fabric Analysis of Late Cypriote Base Ring Ware: Studies in Ceramic Technology, Petrology, Geochemistry and Mineralogy." Ph.D. diss., University College London.

———. 1989. "Petrographic and Microprobe Analyses of Base Ring Ware." In *Vasilikos Valley Project 3: Kalavasos-Ayios Dhimitrios II Ceramics, Objects, Tombs, Specialist Studies*, edited by I.A. Todd, 78–81. *SIMA* 71:3. Göteborg: Paul Åströms.

———. 1991. "Late Cypriote Base Ring Wares: Studies in Raw Materials and Technology." In *Recent Developments in Ceramic Petrology*, edited by A. Middleton and I. Freestone, 337–68. British Museum Occasional Paper 81. London: The British Museum.

Wainwright, G.A. 1914–1915. "Alashia=Alasa; and Asy." *Klio* 14:1–36.

Wachsmann, S. 2000. "To the Sea of the Philistines." In *The Sea Peoples and Their World: A Reassessment*, edited by E.D. Oren, 103–43. University Museum Symposium Series 11, University Monograph 108. Philadelphia: University of Pennsylvania Museum.

Walls, N. 1996a. "Ugaritic Documents from Ugarit." In *Near Eastern and Aegean Texts from the Third to the First Millennia* B.C., edited by A.B. Knapp, 36–40. Sources for the History of Cyprus, edited by P.W. Wallace and A.G. Orphanides, Vol. 2. Nicosia: Greece and Cyprus Research Center.

———. 1996b. "Phoenician Texts (Post-Bronze Age)." In *Near Eastern and Aegean Texts from the Third to the First Millennia B.C.*, vol. 2, edited by A.B. Knapp, 60. Nicosia: Greece and Cyprus Research Center.

Weisman, R.M. 1996. "Petrographic Analysis of Pottery from Alambra." In *Alambra: A Middle Bronze Age Settlement in Cyprus, Archaeological Investigations by Cornell University*, edited by J.E. Coleman, J.A. Barlow, M.K. Mogelonsky, and K.W. Schaar, 447–73. *SIMA* 118. Göteborg: Paul Åström.

Whitechurch, H., and J.F. Parrot. 1974. "Les écailles métamorphiques infra-péridotitiques du Baër-Bassit

(nord-ouest de la Syrie)." *Cahier ORSTOM, Service Geologique* 6:173–84.

Whitechurch, H., T. Juteau, and R. Montigny. 1984. "Role of Eastern Mediterranean Ophiolites (Turkey, Syria, Cyprus) in the History of the Neo-Tethys." In *The Geological Evolution of the Eastern Mediterranean,* edited by J.E. Dixon and A.H.F. Robertson, 301–17. Oxford: The Geological Society.

Yamada, M. 1992. "Reconsidering the Letters from the 'King' in the Ugarit Texts: Royal Correspondence of Carchemish?" *UgaritF* 24:431–46.

Yon, M. 1999. "Chypre et Ougarit à la fin du Bronze Récent." *RDAC*:113–8.

Zaccagnini, C. 1987. "Aspects of Ceremonial Exchange in the Near East during the Second Millennium B.C." In *Centre and Periphery in the Ancient World,* edited by M. Rowlands, M. Larsen, and K. Kristiansen, 57–65. Cambridge: Cambridge University Press.